FLIGHT

First Aero Weekly in the World.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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Mr. D. Graham Gilmour during one of his splendid flights on his Blériot monoplane recently at Brooklands.

THE MARATHON OF THE AIR.

UP to the present moment no definite announcement has been made of the conditions under which the second of the magnificent £10,000 prizes offered by the *Daily Mail* is to be competed for. Nor is it a question which can be settled off-hand, because, if the prize is to attain the object for which it has been offered, it is evident that there are many points to be taken into consideration before the donors and those they take into their confidences over the matter can commit themselves to the laying down of precise conditions. When the first of the £10,000 prizes was put up, flight was a very abstract proposition. Some relatively small things had been achieved which had set the world wondering; and Lord Northcliffe and his advisers, with a very fine perception of the needs of the future, made their conditions difficult enough to ensure that the aeroplane must be improved out of all knowledge before the prize could be won, while not making them too difficult for the inventor of the day to aspire to success.

Now the position is that in the light of our present knowledge of the science of flight with the heavier-than-air machine, a journey from London to Manchester or its equivalent in distance is no longer an epoch-making achievement, as indeed both Paulhan and Grahame-White have shown us, apart from the numerous other cross-country trips that have been performed by numerous other airmen. Therefore, the utterly impossible of five years ago has become the comparatively easy of to-day, and hence arises the difficulty of framing regulations for the conduct of the competition for the second of these splendid ten thousand pound prizes.

If it were the intention of the *Daily Mail* merely to provide a spectacle, the bill would be filled, and filled admirably, by giving the prize for a simple straight-away flight from London to Edinburgh and back or from Paris to London—as have been suggested. But such a journey would in our opinion be far too similar in character to the merely shorter London-Manchester flight to merit the award of a prize of the magnitude of that with which we are dealing at the moment. We can, in fact, take it as proved, that if it is possible—as has been shown—to fly from London to Manchester in really unfavourable weather and to fly across the Channel, then the journey to Edinburgh and back, or between Paris and London, under anything like decent flying conditions, is just as easy of accomplishment. What is really required, and what is doubtless being aimed at by the *Daily Mail*, is a type of task which shall be as difficult to overcome relatively as was the first of these contests at the stage of development when the prize was originally offered. The difficulty is, of course, to hit upon the very best set of conditions for encouraging speedy progress, although we have no doubt that something will shortly be evolved which will be satisfactory to everyone concerned, and will ensure the prize not falling into the lap merely of a lucky aviator who may happen along in a casual sort of way.

In common, possibly, with most others who have given the matter any serious thought, we ourselves have our pet idea as to the conditions which would provide the required type of test, besides affording a most sporting competition and a highly exciting spectacle—a hint of which we gave a couple of weeks ago.

First, let us see briefly what the flights of Paulhan and Grahame-White between London and Cottonopolis demonstrated to us. Everyone will, we think, agree to the following interpretation on the matter:—(*a*) that it is practical, and even easy, under proper conditions, to make a long distance cross-country flight of sufficient duration to cover 200 miles of straight-away course in two flights, or even in one, and (*b*) that the control of the aviator over his machine is as near perfect as reasonably can be, so far as its ascensive properties and its horizontal *direction* of travel are concerned. That is to say, the flying man can proceed in any direction he pleases, and—subject to the limits of fuel-capacity and human endurance—for any distance within reason.

This is excellent up to a point, but it is not enough for a flying public. If the aeroplane is to prove itself of real utility for the purposes of either peace or war, it must also possess controllability in respect of horizontal *speed*; that is to say, in regard to rate of progress through the atmosphere. A machine which can only travel at one invariable speed, no matter how reliable or how controllable in other ways, is but half-way or even less towards the complete solution of the problem of man-flight; and it is the possession of this controllability of speed that seems to us next to need practical attainment and public demonstration.

Hence FLIGHT'S suggestions for the consideration of the *Daily Mail* are that the prize should not be awarded for a single out-and-back flight between any two points, but for two successive out-and-back journeys over the same cross-country course, and that there should be an arbitrary rule imposed as to relative speed on the second trip. On the first to-and-fro journey the speed may be either as high or as low as the aviator chooses. But if, on this first trip, the average speed for the actual distance traversed worked out at say 40 miles an hour, then the second journey would have to be made (with the same machine, of course), at an average of either less than 30 miles an hour, or more than 50 miles an hour—a difference of 25 per cent. one way or the other.

Possibly, too—but from a very different point of view—it might be wise to enforce an interval of a few days between the two performances. Obviously, the object of these big prizes is to assist in the development of the science of aviation, and almost equally to awaken the popular mind to the vast potentialities of the aeroplane, which may well work fundamental changes in our national life and future, unless we, as a nation, face the possibilities of the future with an open mind and a full understanding. Paulhan's flight to Manchester served to stimulate popular interest to a degree bordering on enthusiasm; but, if anything, the interest was not sustained long enough to produce as lasting an effect as it might have had under more prolonged circumstances. It was a case of he came, he saw, he conquered—and he went away—all within 24 hours. The above suggestions lend themselves, we think, to this deep and sustained public interest. As was the case with the London-Manchester flight, it is scarcely likely that when the time comes that man and machine are perfect enough to go for this further rich prize there will be but "a single Richmond in the field." Imagine the interest and the excitement that would pervade the country if two, three, or even more flying men were to succeed in making the first trip at about the same time! The country would simply be seething with excitement and speculation as to which of them, if any, would ultimately prove the victor in this new Marathon of the air within the stipulated period.

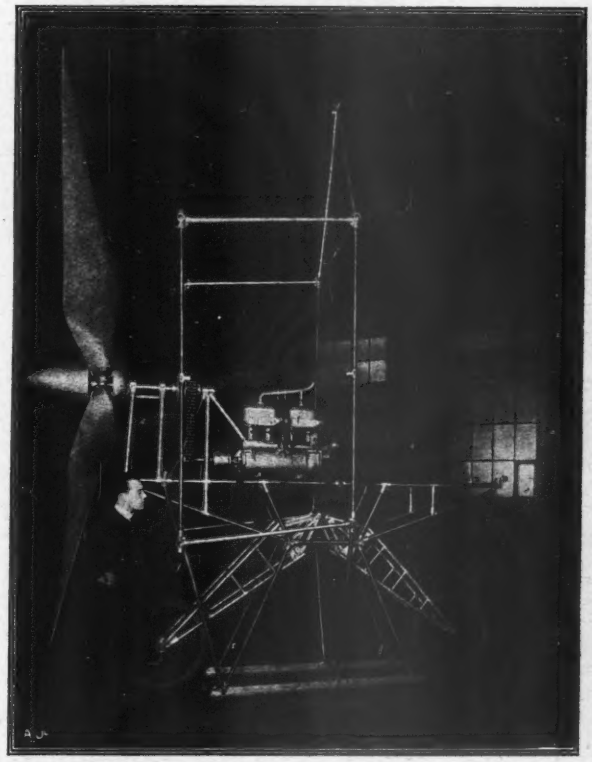
FLIGHT

THE PIGGOTT BROS. BIPLANE.

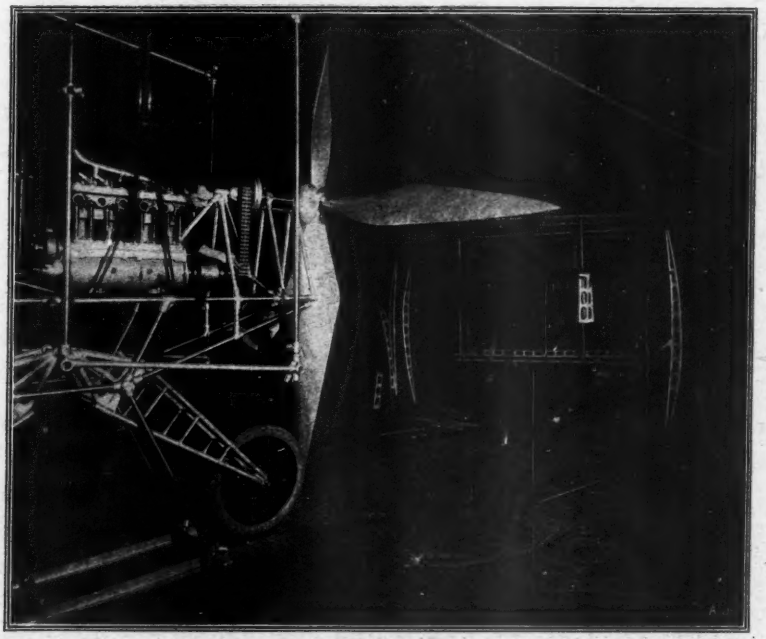
A NEW British-built biplane, the trials of which are about to take place and should be watched with extreme interest, has been constructed by the well-known constructors, Messrs. Piggott Bros. and Co., Ltd., of Bishopsgate Street, to the designs of their engineer, Mr. S. C. Parr. The machine is in every way uncommon, but to the lay mind its outstanding feature of interest is its great size, for it has a span of no less than 60 ft. and is essentially designed for carrying one or more passengers in addition to the pilot. From the point of view of design, the machine is also exceptionally interesting, because Mr. Parr has embodied a very great deal of what may be described as Lanchester's theory. Those who have studied F. W. Lanchester's works on Aerial Flight will recognise certain characteristics in the general form of the aeroplane surfaces; and in other details, too, it is possible to discuss the design from Lanchester's standpoint. This fact is in itself one that we regard as being very important, and the designer is to be congratulated in having taken the trouble at the commencement to master another man's line of thought and to build up his own experience on that as a basis. We do not wish to imply that the design itself is in any way due to Lanchester, who possibly would disagree with much that is represented.

From a constructional point of view the machine is full of interesting details, and possibly the outstanding feature is the extensive use of aluminium. As a system the leading features that are likely to attract most attention are the use of two propellers in tandem and the somewhat peculiar method of suspension.

The accompanying illustrations are somewhat incomplete, having been taken under difficulties while the machine was being dismantled at the factory, but they serve to indicate the more important points. The uncommon character of the design more than justifies



View of the framework of the Piggott biplane, showing the general arrangement of the suspension and the larger of the two propellers in situ.

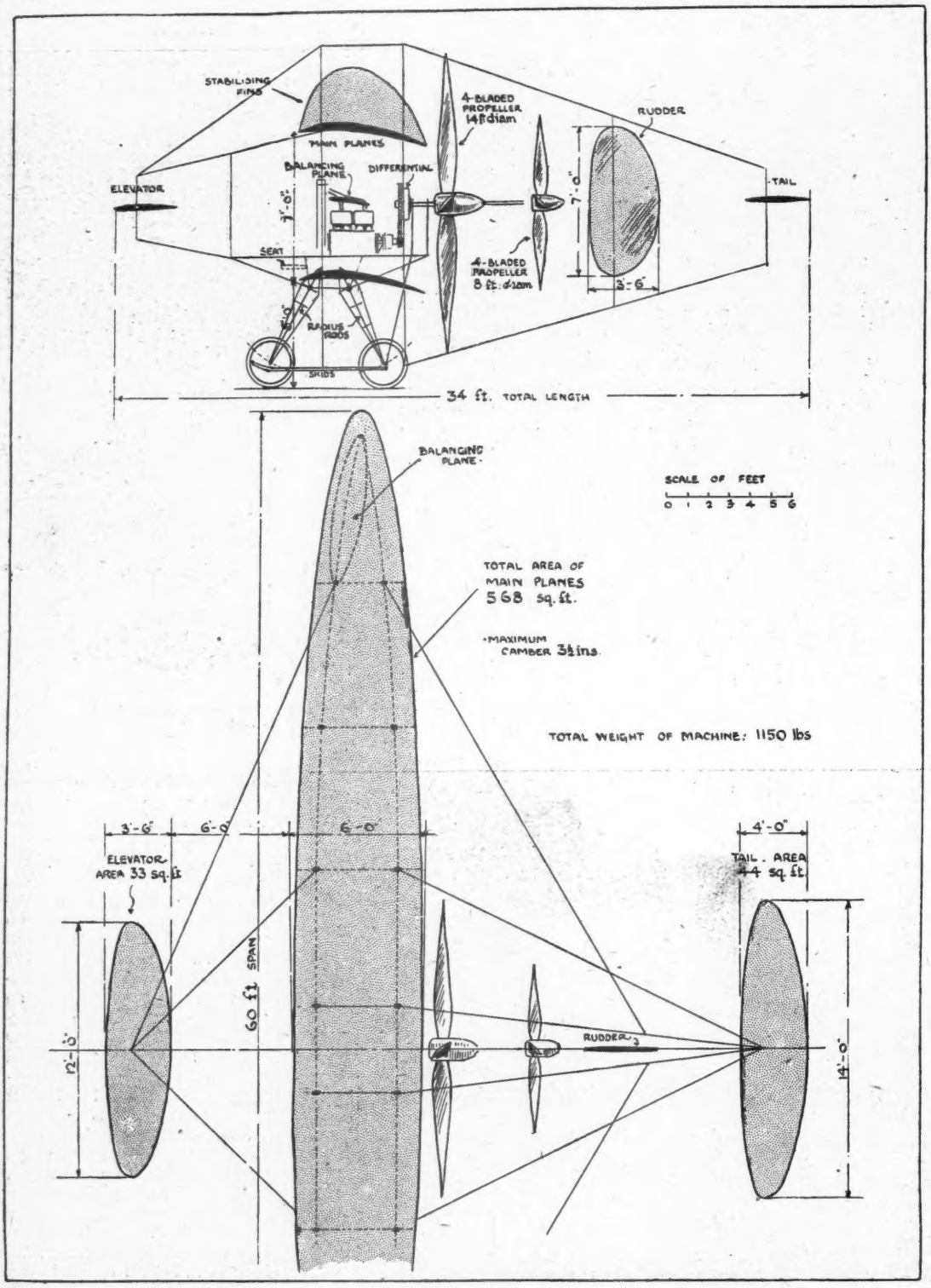


Another view of the chassis of the Piggott biplane, taken while the engine was being dismantled.

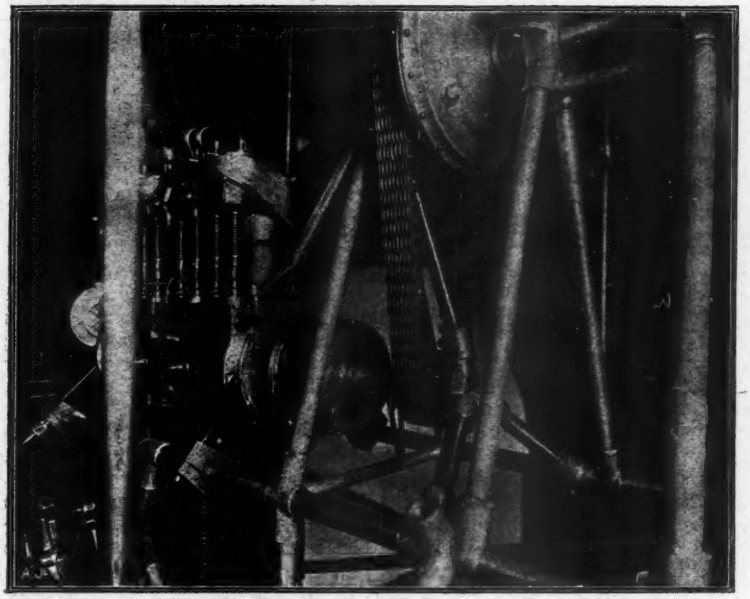
the publication of these particulars in advance of any practical performance on the part of the machine itself.

The machine is, as we have mentioned, a biplane, the decks having a 60 ft. span and a maximum chord of 6 ft. measured on the minor axis of their elliptical plan form. The aspect ratio is thus nominally 10, but the equivalent value of this ratio for an ellipse as compared with a rectangle is unknown. The decks are double surfaced with a special cotton fabric that has been waterproofed and fireproofed by Piggott Bros. The fabric is stretched over built-up ribs shaped to the desired camber, which on the under surface has a maximum value of $3\frac{1}{2}$ ins. situated 2 ft. 3 in. from the leading edge.

About 6 ft. in front of the main decks is a monoplane elevator, and about 15 ft. behind the decks is a fixed monoplane tail. Both members have an approximate elliptic plan form, their leading and trailing



THE PIGGOTT BIPLANE.—Plan and side elevation to scale.



Detail view of the chain drive on the Piggott biplane, showing the multiple-disc clutch between the crank-shaft and the chain-sprocket, and the differential-gear between the chain wheel and the propeller-shafts.

edges being elliptical curves, being drawn to different minor axes. Between the tail and the planes is a monoplane rudder, also similarly shaped. At the extremities of the main planes, between the last pair of vertical struts and midway in the gap, are situated balancing planes for controlling lateral equilibrium.

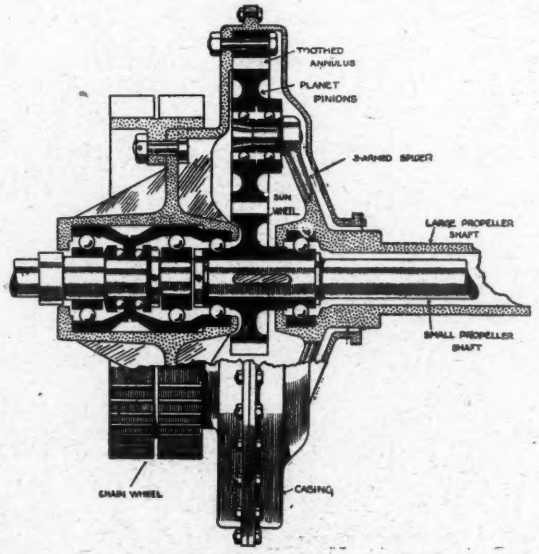
The main planes and supplementary surfaces are all supported upon a central framework that is for the most part constructed of aluminium. This framework carries the engine and the pilot's seat. It is supported upon the ground by a pair of pneumatic-shod triple-spoked wire wheels that are carried by a peculiar pivoted arrangement of cantilevers. The resiliency of the suspension is obtained from a set of helical springs introduced between the inner ends of the cantilevers and the frame.

One of the most uncommon features of the whole design is the propelling mechanism. There are as our illustrations show, two propellers in tandem; both are very large but differ in diameter and in pitch. The larger of the two has a diameter of 13 ft 6 ins.; the smaller has a diameter of 8 ft. 4 ins.

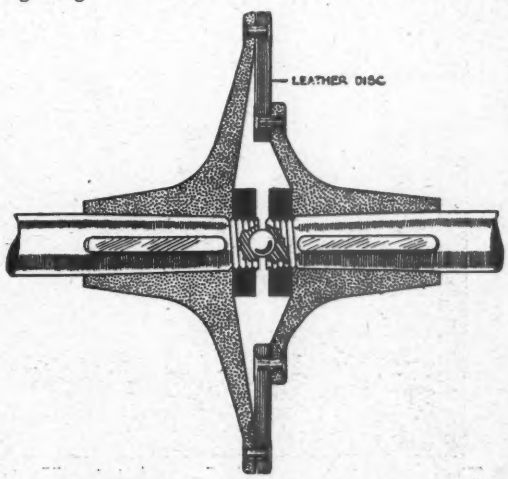
The propellers are driven by chain transmission from the engine through a differential-gear that ensures each propeller taking up its full load. The arrangement of this differential-gear is illustrated by a sectional drawing. The chain wheel, which is driven by the engine, is rigidly bolted to the casing of the mechanism, which carries a toothed annulus. This latter member engages with a set of planet pinions carried by a three-armed spider that is coupled up to the tubular shaft on which the larger of the two propellers is mounted.

The planet pinions also engage with a central sun wheel mounted direct upon the solid shaft that drives the smaller of the two propellers. It will be observed that neither propeller is directly driven by the chain wheel, and it will further be observed that the tendency of the planet pinions is to rotate the small propeller-shaft in the reverse direction to that in which the three-armed spider would "walk" round the sun if that member were held stationary. That is to say, that the propellers revolve in opposite directions.

In order that the large propeller may rotate at all, it is necessary that the three-armed spider should "walk" round the sun, which in turn implies that the sun wheel itself is experiencing resistance to movement. Very little consideration is necessary to show that this system of gearing results in an automatic balance between the

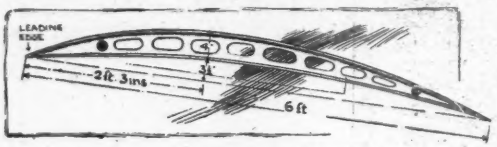


Sectional drawing of the differential gear on the Piggott biplane.



Sectional sketch of the flexible coupling of the propeller-shaft of the Piggott biplane.

two propellers. If there is less load on the smaller propeller than on the larger, the smaller propeller will revolve faster than the other, because the three-armed spider will tend to stand still and thereby cause the mechanism to become analogous to a simple reverse gear. If, on the other hand, it is the smaller propeller that experiences the greater resistance, then the sun wheel will tend to stand still so that the three-armed spider will thereupon walk round it at a relatively greater rate. Whatever happens, therefore, the two propellers must essentially



Sketch of one of the ribs in the main plane of the Piggott biplane.

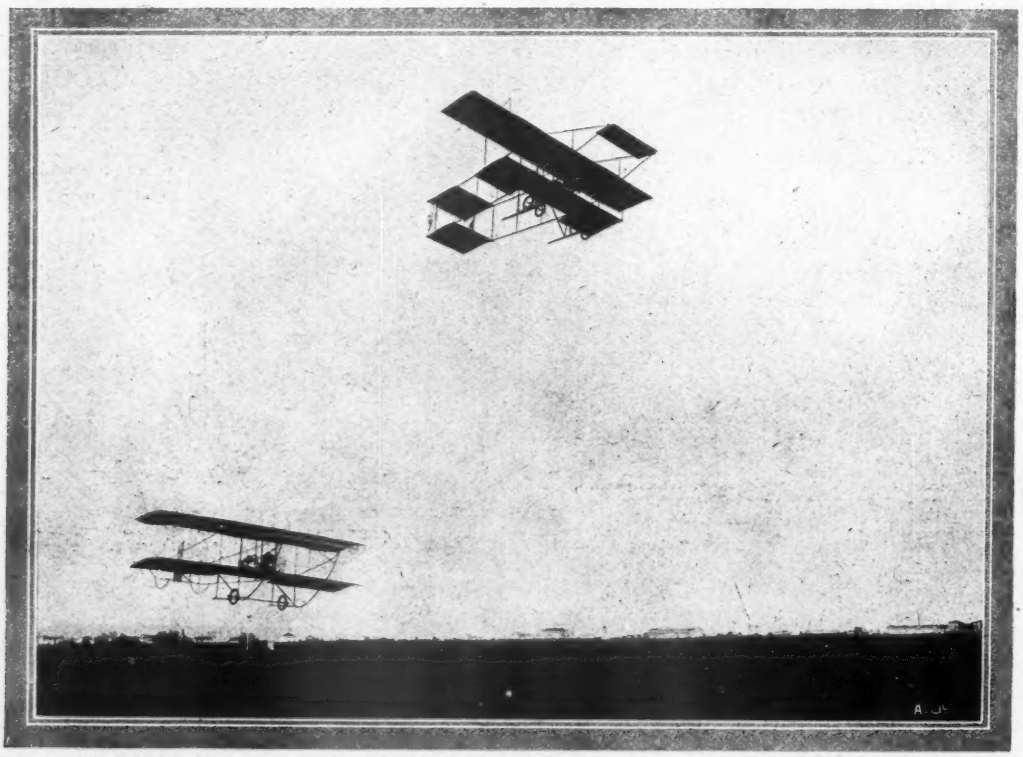
balance one another, and consequently a simple observation of their relative speeds in practice, is sufficient to indicate whether they are operating in accordance with the conditions for which they were designed.

The blades of the propellers have pointed extremities, and are constructed of sheet aluminium; they have a hollow section. Each blade is attached to the boss by a flange, and provision has been made for resetting this flange in order to give a slight variation to the pitch of the blade. The boss proper is enclosed in an ovoid casing so as to improve the stream line form.

In order to compensate for any springing of the frame a flexible coupling is introduced into the solid propeller-shaft. This coupling, a sectional sketch of which is shown herewith, consists of a leather annulus riveted to the flanges on adjacent ends of the shaft. The thrust is communicated from one shaft to another through a steel ball abutment. It is also important to observe in connection with the very large propellers that are employed on this machine, that a clutch is necessary for setting them in motion and for this purpose a leather friction clutch similar to that used on motor cars has been introduced between the crank-shaft and chain sprockets.

In addition to the figures incorporated on the outline drawing, the following data are of interest: power of engine, 70-h.p. at 1,400 r.p.m., 80-h.p. at 1,600 r.p.m.; weight of clutch, 56 lbs.; diameter of clutch over the driving face, 18 ins.; weight of differential gear, 55 lbs.

The fabric weighs about 2¾ oz. per sq. yd. in its natural state and about 3¼ oz. per sq. yd. when dressed. The tail plane weighs 16 lbs. and the elevator weighs 12 lbs. The larger propeller is designed to give a flight speed of 48 miles an hour when the slip is 33 per cent. of the pitch velocity. The smaller propeller is designed to receive the slip stream from the large propeller under these conditions, that is to say it is advancing through air at 104 ft. per second when the larger propeller is working under the conditions above mentioned. The coefficient of longitudinal stability of the machine, calculated in accordance with Lanchester's equation, is 2·85.

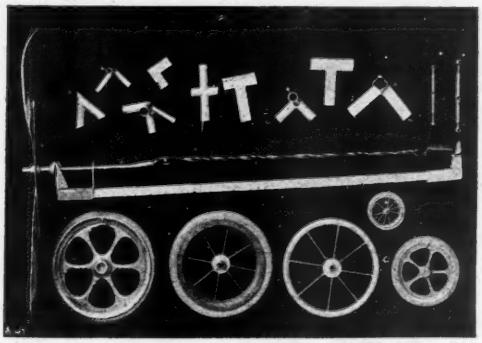


The exciting incident at the Lyons Aviation Meeting when Paulhan, on his Henry Farman machine, overtook Legagneux on his Sommer biplane.

FLIGHT

SOME MODEL ACCESSORIES AND WHERE TO OBTAIN THEM.

Aeroplane Supply Co., Ltd.—The Co. have many small fittings of various descriptions for model aeroplane making, including aluminium sockets and elbows, and small running wheels.



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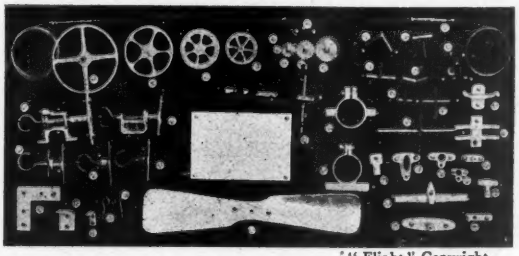
A group of accessories for model aeroplanes by the Aeroplane Supply Co. The elastic motor in the centre is adjustable so as to fit any length model.

A very neat elastic motor which can be adjusted to any length desired and fitted with a spring, to which the end of the elastic is attached, is another of the Company's specialities.

J. Bonn and Co.—This firm manufacture an exceptionally large variety of accessories and parts for model aeroplanes.



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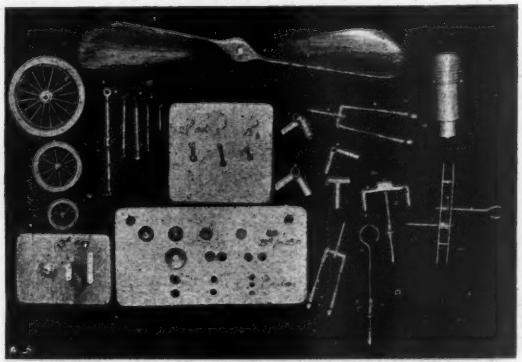
J. Bonn & Co.'s useful assortment of model aeroplane accessories.

Very neatly-made aluminium sockets and strut-holders, feather-weight aluminium rubber-tyred wheels and gear-wheels are interesting features.

They also undertake the manufacture of all kinds of aluminium work, and build models to any design.

T. W. K. Clarke and Co.—A large and useful assortment of accessories for model aeroplanes is supplied by Messrs. T. W. K. Clarke and Co. One of the most interesting of these is the very small forks for miniature wheels, and small scale models of engines for exhibition models. The dummy cylinders for these, which are of aluminium, can be had separately.



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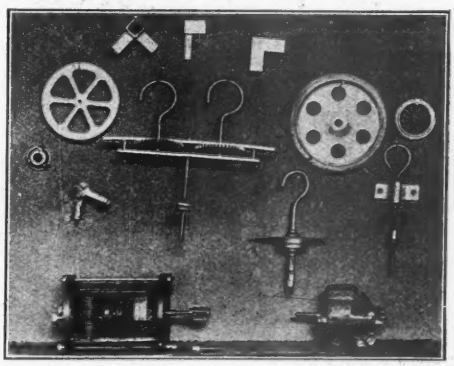
Some of the fittings for model aeroplanes by T. W. K. Clarke and Co. The propeller shown at the top is made from the waste wood from the full-sized propellers made by this firm.

"Flight" Copyright.

A small scale model of a petrol engine and propeller suitable for exhibition models by T. W. K. Clarke and Co.

The small aluminium lugs and sockets are very neatly made in a variety of patterns. Model wooden propellers are also made in various sizes, the wood cut away in making the full-sized propellers being utilised for this purpose.

William Cochrane and Co.—Messrs. Cochrane and Co. have accessories and parts of all descriptions for model aeroplanes, including their special propellers from 6 ins. in diameter and small petrol engines from ¼-h.p. One of their accessories that should prove to be very popular is a very small ball-bearing propeller-thrust, which is very light and allows the propeller to run freely. Other interesting novelties are miniature electric motors, gears and gear-wheels for electric motors, small aluminium running wheels, and an assortment of miniature lugs and sockets.



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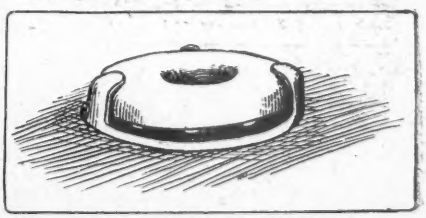
Accessories for model aeroplane making by W. Cochrane & Co. At the bottom of the illustration are two small electric motors.

Chas. B. Timperley.—Mr. Timperley has earned a good reputation with his working models of the best-known types of aeroplanes, and small petrol engines from ¾-h.p., whilst he supplies a varied assortment of model aeroplane parts.



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A neat little ball-bearing propeller-thrust, about ½-in. in diameter, by W. Cochrane and Co.

The Twining Aeroplane Co.—This firm makes up parcels of materials with drawings for building many different types of model aeroplanes. Model propellers, finished planes, and ready-made models are also very extensively supplied by the Company.

Harris and Samuels (Eyquem's Patents).—A fine selection of fittings and parts for model aeroplanes, such as miniature bicycle wheels, wood wheels, ball-thrusts, aluminium and brass lugs and sockets, wire and fabric is always available from Messrs. Harris and Samuels, whilst a special line this firm stock is the genuine model "Integral" and "Normale" propellers made by the manufacturers.

BRITISH FLIGHT ENGINES.

THE 45-H.P. DE HAVILLAND.

IN view of the rapidly increasing demand that there is for all-British engines of very light weight for use upon flying machines, a special welcome must be extended to every genuine attempt that is made by men like Mr. G. de Havilland to produce a substantial internal-combustion engine of comparatively high power, that is light enough for the work in hand. Particular interest attaches to this individual design, not so much because it embodies any radical departures of a startling kind from well proved practice, but rather because the arrangement as a whole has been well tried in its heavier forms by more than one successful manufacturer of automobiles long ere now. In fact, the ingenuity of the inventor has chiefly had to be exercised in reducing the number of parts and in cutting down the weight of each individual part wherever possible; while, now that the first of these engines has been built and tested, a very fair meed of success can already be claimed for it.

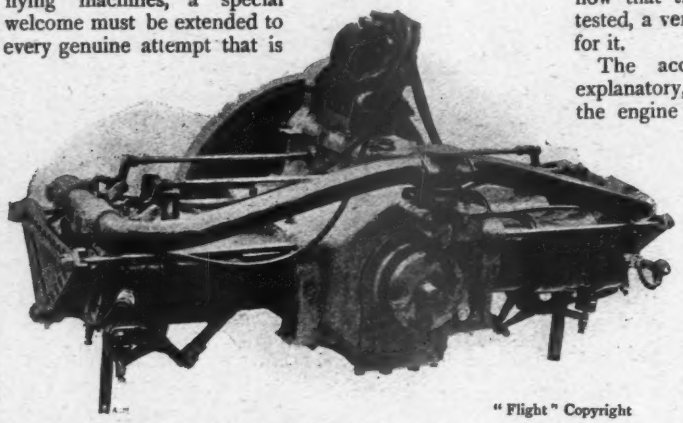

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Fig. 1.—In Mr. de Havilland's engine the four horizontal opposed cylinders are held in place by three long bolts fitted with triangular yokes, and the cylinder-jackets for the cooling water are formed by short lengths of copper tubes.

The accompanying illustrations are almost self-explanatory, since our photographs enable us to show the engine from three distinct points of view, while the added line drawings bring out those further constructional details which can only be conveyed by sectional elevations. Primarily it will be observed that four very light cast-iron cylinders are held horizontally in pairs on opposite sides of the centrally-placed aluminium crank-chamber, by means of long steel bolts and inter-connecting yokes. The three bolts on each side lie with relationship to each pair of cylinders in the manner which is clearly brought out in our illustrations; and the triangular yoke which is forced up tightly against the cylinder-head by means of the three nuts has a curved surface that corresponds with a rounded bridge on the cylinder-head, thus rendering the yoke self-aligning with the cylinders.

Each cylinder-casting provides a valve-chamber at its extreme end, with water passages around the seatings of the valves, but the jacket proper around the cylinder itself is subsequently formed by a copper tube, which is held in place by means of flanges butting up against the soldered rings at either end. As in the ordinary way, the exhaust-valves lie immediately beneath the inlet-valves, so that the latter form inspection-covers for the former; but one of the special features of the de Havilland engine is that all eight valves are operated by a single cam-shaft, this cam-shaft being accommodated inside a separate chamber immediately above the crank-shaft.

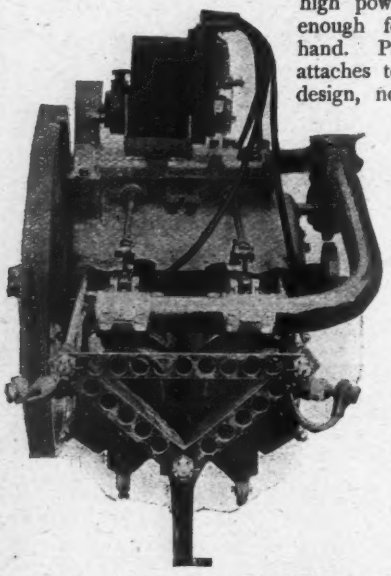

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Fig. 2.—Each inlet-valve constitutes an inspection-cover for each exhaust-valve, the former being held down by a couple of studs, and all the valves being operated by a single cam-shaft fixed in the upper part of the crank-chamber.

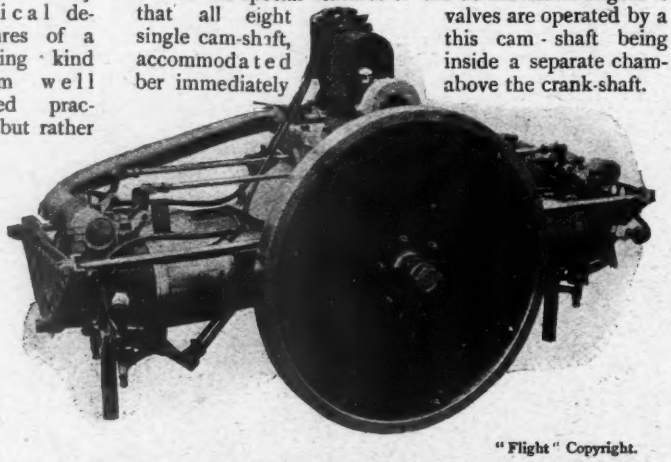

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Fig. 3.—A high-tension magneto fixed above the cam-shaft, and driven from it by spur-gearing, feeds the four ignition plugs that pass direct into the combustion-chambers between the inlet and exhaust-valves. The above photograph also shows the construction of the large light fly-wheel, with its steel rim and flat discs.

It will readily be observed from our drawings how the push-rods for the exhaust-valves are led down diagonally from this cam-shaft chamber so that they pass between the two cylinders and engage with bell-crank-levers

carried beneath. The bell-crank-levers themselves are supported on rock-pins projecting from the lower long bolt which holds the cylinders in place, this bolt being of special square section and of additional strength to withstand the strain. All the rods for working the valves are hollow for the sake of lightness; and similarly the gear-wheels (including the idle intermediate wheel) which drive the cam-shaft are lightened out as much as is consistent with strength.

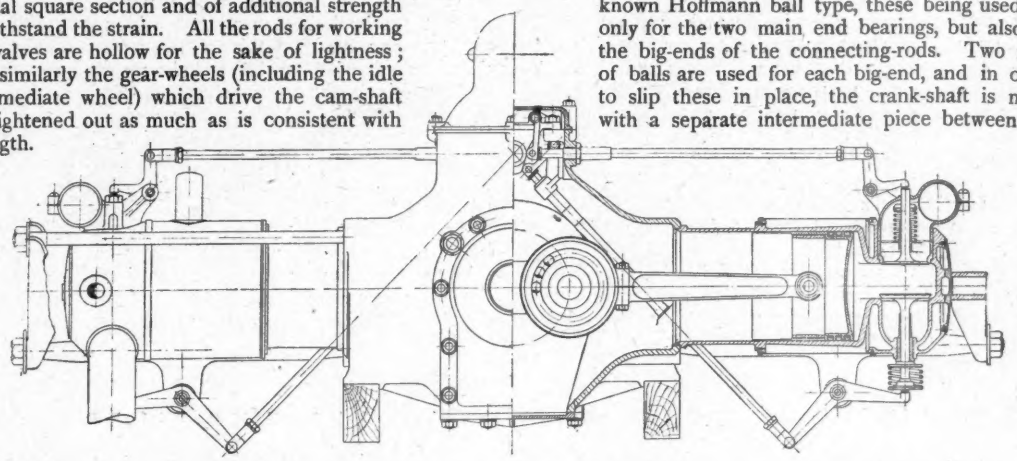

Fig. 4.—The position and arrangement of the valves, of the copper cylinder-jackets, of the pistons, and of the valve-operating gear with the cam-shaft, are clearly demonstrated in this side elevational drawing.

Each pair of inlet-valves is fed by a single pipe of large size from the centrally-placed carburettor, the pipe being merely clamped in place to the castings which serve to hold each inlet-valve in place. A couple of studs serve to draw these castings down on the inlet-valve proper, and the little bell-crank-levers that actuate the valves are fulcrumed to the castings themselves. Where the induction-pipe passes through the clips in the castings, the pipe has its wall cut away, thus establishing a free open passage from the carburettor direct to each valve.

For convenience in dismantling, the carburettor with its throttle-valve is held in place against the crank-chamber by a single nut, while similarly the float-feed-chamber is held up against the carburettor proper by one bolt only, thus facilitating ready inspection of the jet.

Incidentally, too, it may be mentioned that the float is made of cork treated with celluloid.

All the bearings on the crank-shaft are of the well-known Hoffmann ball type, these being used not only for the two main end bearings, but also for the big-ends of the connecting-rods. Two rows of balls are used for each big-end, and in order to slip these in place, the crank-shaft is made with a separate intermediate piece between the two opposed crank-pins. A large single row of balls constitutes the end bearings, and there are mounted in the cover-plates to the crank-chamber in such a way that the crank-shaft can be let down bodily if at any time it is desired to inspect it or remove it.

Very great confidence is placed, after the experience which Mr. de Havilland has had with the use of Hoffmann ball-bearings on the crank-shafts of internal-combustion engines when used under extremely trying conditions for various types of work, in these large ball-bearings used in this particular way; and we need hardly remark that they very greatly simplify the question of lubricating, inasmuch as it is virtually only necessary in this engine to see that the four pistons with their gudgeon-pins receive a proper supply of oil. These pistons, by the way, are constructed in a special manner, each one being made in two parts. Our sectional elevation does

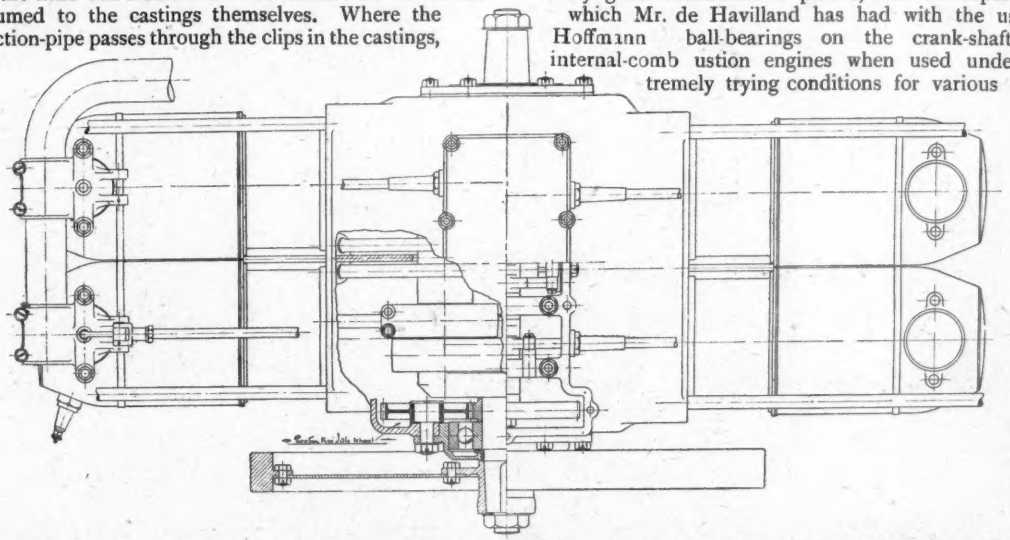

Fig. 5.—In the above plan view may be seen the arrangement of the cam-shaft, of its idle intermediate wheel, of the large Hoffmann end ball-bearings, and of the built-up fly-wheel, which last-mentioned, however, has two steel discs instead of one, as shown in this drawing.

not show the latest arrangement that has been adopted though it indicates roughly the general principle employed. The back portion, which carries the rings, is turned from the solid out of vanadium steel, and being machined accurately inside and out, a uniform thickness can be ensured; while the front portion is a steel casting, through which, as well as through the back portion, the gudgeon-pin is made to pass.

It will, of course, be realised that the opposing cylinders are fixed slightly out of line with one another, and also that the connecting-rods are slightly out of centre with the pistons as regards the big-ends. In this way, very little overhang is caused to exist, and the connecting-rods are rendered quite independent of each other upon each crank-shaft.

The cylinders have a bore of $4\frac{1}{2}$ ins. by a stroke of $4\frac{3}{4}$ ins., and the engine is intended to run at a normal speed of about 1,500 revs. per min. At that speed, its output is about 40 to 45 b.h.p., which practically means that it develops one horse-power for each $5\frac{1}{2}$ lbs. of total weight. Its total weight, equipped as shown in our photograph (*i.e.*, without its exhaust-pipes or its complete water-connections, but complete with its fly-wheel, magneto, and all the other parts visible in those illustrations), is 250 lbs. Of this, 27 lbs. represents the relatively large fly-wheel, which is built up with a steel rim and two $\frac{1}{8}$-inch steel discs.

This first engine has recently undergone its initial bench tests at the Willesden works of the Iris Motor Co. (Messrs. Legros and Knowles), where it has been built for Mr. de Havilland. Our photographs were, in fact, taken immediately after these first tests had been conducted, and when it had proved that it had a considerable future before it for aeroplane work. Sufficient has already been said to indicate its main characteristics in all respects, but in conclusion we might remark that various minor details to which we have not specifically referred are easily discernible from our photographs and drawings.

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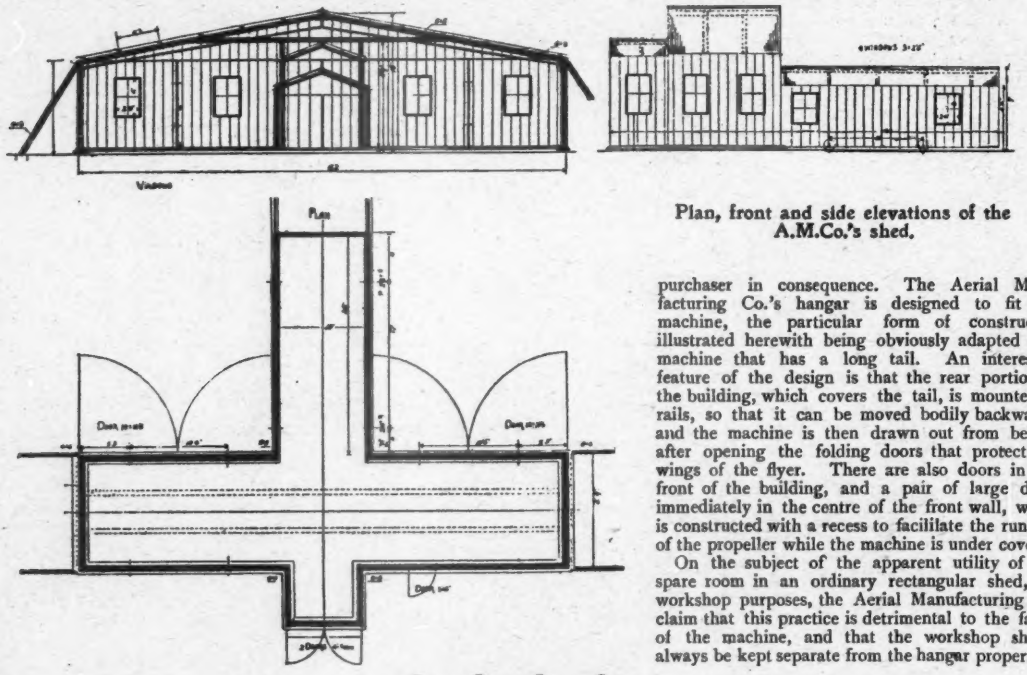
AN AEROPLANE SHED THAT FITS THE MACHINE.

MOST aeroplane sheds are of the simple rectangular form, but the Aerial Manufacturing Co. have adopted a type of construction that saves, so they claim, about two-thirds of the roof area employed in the orthodox shaped building, and about half the price to the purchaser in consequence. The Aerial Manufacturing Co.'s hangar is designed to fit the machine, the particular form of construction illustrated herewith being obviously adapted to a machine that has a long tail. An interesting feature of the design is that the rear portion of the building, which covers the tail, is mounted on rails, so that it can be moved bodily backwards, and the machine is then drawn out from behind after opening the folding doors that protect the wings of the flyer. There are also doors in the front of the building, and a pair of large doors immediately in the centre of the front wall, which is constructed with a recess to facilitate the running of the propeller while the machine is under cover.



Plan, front and side elevations of the A.M.Co.'s shed.

On the subject of the apparent utility of the spare room in an ordinary rectangular shed, for workshop purposes, the Aerial Manufacturing Co. claim that this practice is detrimental to the fabric of the machine, and that the workshop should always be kept separate from the hangar proper.

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CRANK-SHAFTS FOR PETROL ENGINES.

BUILDERS of high-speed petrol engines of every kind, whether for automobile work or for the propulsion of aerial craft, are inevitably unanimous in regarding the crank-shaft as being the most important single component part of any engine of this character. A considerable amount of general interest therefore attaches to the latest Ambrose Shardlow and Co. catalogue, of which a copy has been sent us by Messrs. Barron and Bithell, of Birmingham, for therein are contained full particulars of all the various types of crank-shaft, the construction of which constitutes so large a section of this Sheffield firm's output. Any of the highest grades of steel, such as chrome-vanadium or nickel-chrome, can be obtained from them, either as rough forgings or in finished form; and apart from the special plant for the scientific heat treatment of the steels, a full equipment of up-to-date machine tools has been installed expressly for crank-shaft work. All and every customary type, from those having a single throw up to those for six-cylinder engines, are turned out regularly, while comparatively lately hollow shafts for flight engines have been added to the standard models.

FLIGHT

CONTINENTAL AVIATION MEETINGS.

The Lyons Meeting.

LAST week we were able to chronicle the doings at Lyons up to Tuesday, when all had gone smoothly. During the last days of the meeting, unfortunately, several bad smashes occurred, one of them ending fatally. On Wednesday the squally weather continued, and so curtailed the flying considerably. Paulhan, Legagneux, and Van den Born, however, made splendid performances in the various competitions. For the height prize, Paulhan went up to 510 metres, while Latham was second at 178 metres. In passenger carrying, Paulhan was best with a distance of 34 kilomes., while Legagneux flew with Mme. Herriot, Mayoress of Lyons, for 19 kiloms. The longest flight of the day was by Van den Born, who covered 56 kiloms. Metrot had a nasty tumble when skimming close to the ground. The tail fouled something, and caused the Voisin to capsize, the aviator being thrown out and badly bruised but not seriously hurt. On Thursday the weather conditions were such that none of the aviators attempted to fly, and the tempest wrecked several of the temporary wooden buildings. The following day the competition was for long distance, and in this Van den Born excelled. His best trip was of 2 hrs. 15 mins., while the best performances of the other flyers were, Legagneux 1 hr. 39 mins., Chavez 1 hr. 1 min., Paulhan 50 mins. 27 secs., Latham 41 mins. 52 secs., Molon 12 mins. 31 secs. Just as dusk was falling Hauvette-Michelin brought out his Antoinette for testing it. He made two short trials and then started off for a third at a great speed. He collided with a mark post, which breaking, fell on his head. Paulhan conveyed him with all speed in his motor car to the hospital at St. Luc, where trepanning was performed, but the aviator, who was only 26 years old, passed away three hours after the accident. Both Latham and Legagneux were unfortunate on Saturday, the former breaking the tail of his machine through an awkward landing, while the latter capsized during a trial in the evening. Very little flying was done during the day, Van den Born scoring the best performance by covering 24 kiloms., and Paulhan second with 11 kiloms. Sunday, the final day, saw only four aviators in the air, Van den Born, Chavez, Paulhan and Molon being the only pilots whose machines were able to fly. The first named made his position as winner of the Totalisation Prize doubly sure by a flight of 2 hrs. 23 mins. During the whole meeting he was in the air 14 hrs. 12 mins., Legagneux being second with 12 hrs. 17 mins. 12 secs. In the height contest Paulhan excelled by rising to 920 metres, while Chavez was second, being content with an altitude of 450 metres.

Total Cumulative Times.

		h.	m.	s.
1.	Van den Born (H. Farman)	14	12	0⅘
2.	Legagneux (Sommer)	12	17	12
3.	Chavez (H. Farman)	5	17	19
4.	Paulhan (H. Farman)	4	55	43
5.	Latham (Antoinette)	2	9	10
6.	Molon (Blériot)	1	46	14
7.	Metrot (Voisin)	1	22	4

Speed Prize (20 kiloms.).

		h.	m.	s.
1.	Paulhan (H. Farman)	0	19	18⅘
2.	Van den Born (H. Farman)	0	21	9
3.	Chavez (H. Farman)	0	21	27

Aerodrome Circuit Prize.

		h.	m.	s.
1.	Latham (Antoinette)	0	7	37⅘
2.	Van den Born (H. Farman)	0	8	12

Grand Prize for Distance.

		h.	m.	s.
1.	Van den Born (H. Farman), 75·648 kiloms. in	1	22	56⅘
2.	Legagneux (Sommer), 75·648 kiloms. in	1	28	0⅘
3.	Chavez (H. Farman), 41·661 ,,	0	49	26⅘

Passenger Prize.

		h.	m.	s.
1.	Paulhan (H. Farman), 34·479 kiloms. in	0	37	37⅘
2.	Legagneux (Sommer), 19·479 ,,	0	24	19

Height Prize.

1.	Paulhan (H. Farman)	920 metres
2.	Chavez (H. Farman)	450 ,,
3.	Latham (Antoinette)	178 ,,

Speed Prize (6 circuits).

		h.	m.	s.
1.	Paulhan (H. Farman)	0	9	45
2.	Latham (Antoinette)	0	10	34

Starting Prize.

1.	Paulhan (H. Farman)	59·40 metres
2.	Latham (Antoinette)	60·10 ,,

Prize for Heaviest Weight Carried.

1.	Paulhan (H. Farman)	73 kilogs.

St. Petersburg Meeting.

ALTHOUGH some very good flying was seen when there was a lull in the wind, it was so seldom that this occurred that the St. Petersburg meeting can hardly be called a success. After the comparative inactivity of the two opening days, Tuesday was quite busy. Popoff and Morane each flew for a few minutes over an hour, while Christiaens made a spectacular trip over the sea towards Cronstadt, his altitude being about 200 metres. Competing for the height prize, Popoff reached a height of 454 metres, while Morane attained 270 metres. On the following day Popoff was again the star performer, as he was up for 2 hrs. 8 mins., during which he travelled outside the boundary of the aerodrome and traversed the surrounding country. Christiaens also made a long trip, being aloft for 1 hr. 37 mins. The wind again asserted itself on Thursday, and only very short trials were accomplished. Popoff was unfortunately capsized by one of the strong gusts which considerably damaged his machine. Friday was a blank day as the wind did not drop sufficiently all day to entice the flyers out. Saturday too was a day of misfortune, and although five aviators ventured up, each of them retired with their machines more or less damaged, while the longest total time in the air was that of Morane, whose record was 8 mins. 4⅘ secs. Popoff broke his second Wright machine, Wiencziers again capsized his Antoinette, Morane's Blériot and Christiaens' Farman collided, while Madame de la Roche smashed the stabilising planes on her Voisin. On Sunday, the last day, rain fell from morning till night, and although Edmond and Christiaens attempted to fly, they gave up in despair after half a circuit. The results of the meeting were:—

Total Cumulative Time.

		h.	m.	s.
1.	Christiaens (H. Farman)	4	19	53
2.	Morane (Blériot)	3	46	0⅘
3.	Popoff (Wright)	3	19	51
4.	Edmond (H. Farman)	12	49	0⅘
5.	Wiencziers (Antoinette)	0	4	4
6.	Mme. de la Roche (Voisin)	0	3	0

Speed Prize.

		h.	m.	s.
1.	Christiaens (H. Farman)	0	5	9
2.	Edmond (H. Farman)	0	5	11⅘

Height Prize.

1.	Morane (Blériot)	120 metres

Unofficial Flights.

1.	Popoff (Wright)	454 metres
2.	Morane (Blériot)	270 ,,
3.	Christiaens (H. Farman)	200 ,,

Passenger Prize.

		h.	m.	s.
1.	Christiaens (H. Farman)	0	5	30

Further Flying at St. Petersburg.

ALTHOUGH the meeting officially closed on Sunday, there was a good deal of flying on Monday. During the day the Czar, accompanied by Prince Henry of Prussia, and a large party of Grand Dukes and Ministers, paid a visit to the aerodrome and spent some time in examining the various machines, after which it was announced that two Farman machines had been bought by the Minister of War. During some trials both Morane and Wiencziers fell on to the grand stand. Several people were seriously injured, among them General Kovanko.

The Berlin Meeting.

LIKE as at St. Petersburg, the wind played havoc with the intentions of the promoters of the flying meeting at Johannisthal last week, and so Berliners had very little sport. On the opening day, 10th inst., the only flights were those of Capt. Engelhardt, who on his Wright machine made three circuits of the ground, while Jeannin on his Farman made one round. Keidel on a Wright only managed a half circuit and then fell to earth. On Wednesday no flying was possible, but a good deal of sport was witnessed on the following day between storms. Frey flew for 25 mins. on his H. Farman biplane, and Capt. Engelhardt carried a passenger for 12 mins. 22 secs. Jeannin and Gorrissen also made two circuits of the ground. During the day one of the Parseval dirigibles cruised over from Tegel, and Frey flew underneath it for some time. Friday saw a keen contest between Capt. Engelhardt and Jeannin for the endurance prize. This was eventually won by the latter with a trip which lasted 2h. 39m. 25s. Captain Engelhardt had to come down after 2h. 21m. 45s., as one of the stays of his machine had become loose. Saturday was a day of mishaps. Jeannin, after flying for 1 hr. 23 mins., when on terra-

firma, in trying to avoid two men on horseback, got the wheels of his machine in a rut, with the result that it capsized, and was smashed.

Captain Engelhardt also came to grief, through colliding with a mark-post, after flying with a passenger for 17 mins. Thelen came down on the wings of his machine, and broke them, while Thorup, through damaging his rudder, was unable to avoid fouling some trees. Three circuits of the aerodrome were successfully made by De Caters and Gorrissen, while Frey flew for 35 mins. Frey announced his intention of flying to Berlin, but this was forbidden by the authorities under pain of total disqualification. On Sunday no lengthy flights were made, but Swendsen, Thelen, Frey, Behrend, Keidel, and De Caters each made trips of about 10 mins. each, while Amerigo made one circuit of the ground.

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BOOK REVIEWS.

"The Aeronautical Classics."

UNDER the joint editorship of Messrs. T. O. B. Hubbard and J. H. Ledeboer, a series of aeronautical classics is being published by the Aeronautical Society of Great Britain, and the first two volumes are now to hand. The first volume contains a reprint of Sir George Cayley's articles that were first published, just over a century ago, in *Nicholson's Journal*. The second volume is similarly a reprint of some articles published by Wenham in the first annual report of the Aeronautical Society, 1866.

We congratulate the Council of the Aeronautical Society in having undertaken the publication of these historic contributions to aeronautical science, and more particularly, perhaps, for having issued them in a form that ensures their entry, as a matter of course, into the libraries of everyone interested in the subject of aviation. We cannot, for instance, imagine anyone who felt even the smallest concern in the theory of flying machines not acquiring, and perusing with pleasure and instruction, those early articles by Sir George Cayley, who unquestionably was the father of accurate thought on problems in aerodynamics. (Aeronautical Society of G.B. 1s. each.)

"Flying Machines—Practice and Design."

WE have seriously studied Mr. Rankin Kennedy's latest edition to his numerous small works, and although in common fairness we wish to give the author the benefit of all doubt concerning his expressed desire to help the beginner, we do at least feel that it is only proper to make a protest against the bare setting forth of new "theories" without making it expressly understood to the reader upon what they are based, and in what respect they differ from the theory of those who can certainly claim to have some authority in this particular field. This little book is got up in a style to appeal in a popular way to a large number of beginners, and we have rather a feeling of pity for the conscientious reader who masters Mr. Rankin Kennedy's teaching, for we cannot believe that they will in the long run help him very far to a proper understanding of the subject.

Mr. Rankin Kennedy professes in this work to treat the design and construction of flying machines in a popular manner, "but upon a strictly scientific basis, and with new formulæ, rules, measurements, and principles." But here are some examples of what he has to say:—

"The author prefers to somewhat modify the formulæ so that the doubtful factor of surface area of the planes is eliminated. The important area, A, with which we have to deal, is the air swept over by the aeroplane in its horizontal flight, in sq. ft. per sec.; the forward speed, S, is only one factor in the quantity. The span, *l*, of the aeroplane, that is its length transversely to its line of flight, is the other factor, so that, A, the air swept by the plane, $= S \times l$."

"It is necessary in practice to build the aeroplanes to some angle of definite value. An angle of about 9° seems best for machines, working in air, at forward speeds of 40 m.p.h. or thereabout."

"The 'aspect' of the planes takes care of itself, and need not be considered at all; neither need we consider, S, total surface of planes, that also follows naturally without any calculation."

"In setting out the design of an aeroplane we must determine upon two factors—the speed forward, S, and the weight, *w*, to be sustained in the air. The best inclination of the plane, from experience and also from theoretically examining the problem, we take to be six to one. . . . From these we may proceed to determine the velocity, V, of the air deflected downwards by the aeroplane at its assumed speed forward. We assume this speed to be 60 ft. per sec. for present purposes. . . . . For an incline of 6 to 1, taking 6 as the base and 1 as the perpendicular, the value of V is . . . . 10 ft. per sec. From the fact that in some practical man-carrying aeroplanes, at present, their weight, *w*, is 1,200 lbs. total, we can, in order to illustrate the methods of calculation, assume *w* as 1,200 lbs. to be lifted, and leave it to the designer to keep the weight below that figure. . . . A lift, L, is required to support *w* 1,200 lbs. in air, hence, L, the lift, is 1,200 lbs. Now by fundamental formulæ, W, the weight of air to be accelerated is $W = \frac{w \times g}{V} = 3{,}840$ lbs. of air accelerated to 10 ft. per sec."

"We now proceed to find the first requisite dimension of the aeroplane; that is the length of the planes, *l*, or total span of the planes on a machine of this weight and speed. $l \times s$ = area, A, swept in one second, and $A = \frac{W}{V \times BC \times .08} = 4{,}800$ sq. ft. We know S = 60, hence $L = \frac{4{,}800}{60} = 80$ ft. span, the amount of all the spans added together, say, two planes each 40 ft. long."

". . . . . Whether it is better to use two or three or four large planes, or a multiplicity of small planes, has not been practically demonstrated, but we know that the biplane and monoplane machines have flown with some success, while no great success has followed the trials with multiplanes."

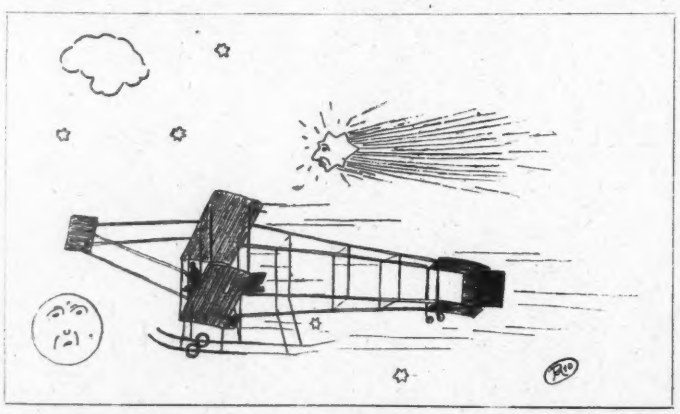
"Hitherto we have assumed the planes to be flat. In practice they are curved, and just what the curve should be is not practically settled; for a time it will be left to the experience and opinion of designers. What we are concerned about at present is the fundamental principles, which should be mastered by all interested in aeronautical subjects."

Merely as an incidental question, we should like to ask Mr. Rankin Kennedy what the factor BC—which is the sine of the angle of inclination measured in feet at the leading edge of the aeroplane—is doing in the above equation, where the weight of air dealt with would appear to be satisfied by the factors, A (area), and V (velocity), with the value .08 as representing the density of the fluid?

So far as we can gather—and this is confirmed by his diagrams—the author is unaware of the principles associated with the dipping front edge of a cambered aeroplane, and with the influence of the upper surface as an agent in increasing the lift by deflecting a stratum of air above the aeroplane.

In order to indicate in his "forewords" what he is pleased to term the "chaotic state of the art," the author quotes from "a leading article in a leading journal devoted to flight," a passage that may or may not have appeared in FLIGHT. If it did, this passage in its original use must have had reference to a specific item only; but it occurs to us that it is far from being inappropriate for re-quotation here as being suggestive of the practical value of the contents of the book under review.

"The only way to commence is to start by guessing, and then follow on by modifying the values chosen until a reasonable agreement is obtained ———." (Technical Publishing Co., price 5s.)



HALLEY'S COMET.—Oh, lor! that's the third one that's passed me!
(But it was only Paulhan.)

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Hurlingham.

OWING to the death of King Edward VII, the Balloon Contest fixed for Saturday, the 28th inst., at Hurlingham, will not take place.

Bournemouth Aviation Meeting.

Owing to the Whitsuntide holidays the Programme and Regulations of the Bournemouth International Aviation Meeting have not been received in time for this issue. Intending competitors will note that it is a condition that all entrants shall hold an aviator's certificate issued by the Royal Aero Club or other club forming part of the Federation Aeronautique Internationale.

Hotel Accommodation.—Owing to the large number of applications for accommodation at the Hotel Burlington, only a few rooms are now available, and members desirous of securing same should make early application to the Secretary of the Club.

Aviators' Certificate.

The Royal Aero Club of the United Kingdom will grant certificates in accordance with the rules of the Federation Aeronautique Internationale to aviators who have complied with the following rules:—

RULES.

1. Three separate flights must be made, each of 3 miles round a circular course without coming to the ground. These flights need not necessarily be made on the same day. On the completion of each flight the engine must be stopped in the air, and a landing effected within 150 yards of a given spot previously designated by the candidate to the Official Observers.

2. Each of the three trials must be vouched for by officials appointed by the Royal Aero Club, and a certificate obtained for each flight. All trials to be under the control of, and in places agreed to by, the Royal Aero Club.

3. Before being allowed to compete for certificates, candidates must, if called upon, satisfy the Committee of the Royal Aero Club of their ability to fly 500 yards, and of making a gliding descent with the engine stopped.

4. All attempts must be made between sunrise and sunset, and suitable previous notice must be given to the Secretary of the Royal Aero Club.

5. The Royal Aero Club declines all responsibility for any accidents, or any damage that may occur to the aviators, their machines, or to any third parties during or in connection with the qualifying tests of the candidate.

6. Candidates desirous of qualifying for certificates must make application on a form provided for that purpose. Expenses incurred, if any, must be borne by the candidates.

7. The Committee of the Royal Aero Club will decide if the candidate has qualified for a certificate, but reserves the right to refuse the same or withdraw the same at any time without giving reasons.

8. Foreigners belonging to a country represented on the Federation Aeronautique Internationale can only receive a certificate from the Royal Aero Club after having obtained the consent of their national sporting authority, as approved by the Federation Aeronautique Internationale. A certificate may be granted to a foreigner whose country is not represented on the Federation Aeronautique Internationale.

9. The decision of the Committee of the Royal Aero Club in all matters connected with the trials is final and without appeal.

10. The Committee of the Royal Aero Club may in special cases waive any or all of the above rules, and grant certificates at its discretion.

Long Distance Balloon Race.

(Cup presented by the Hon. Mrs. Assheton Harbord.)

1. The prize must be competed for during the three months commencing May 15th and ending August 15th, 1910.

2. The prize will be awarded to the competitor who, in a single trip, covers the greatest distance. Such competitor need not be the aeronaut in charge, but must make the ascent.

3. Competitors may ascend from any place within 12 miles of Charing Cross.

4. The distance must be covered in Great Britain only, *i.e.*, the crossing of the open sea (*e.g.*, the English Channel, Irish Sea, &c.) will not be permitted; this, however, need not be taken to apply to indentation in the British coast, such as the mouth of a river, &c.

5. To prevent competitors landing too near the sea, the distance will be measured only up to within 5 miles from the point at which their line of direction permanently leaves the British coast.

6. The prize will be open to Members of the Royal Aero Club of the United Kingdom only, who must not be accompanied by a professional aeronaut.

7. Ordinary balloons only must be used, inflated with ordinary coal gas.

8. There is no restriction as to size of balloon or number of passengers carried.

9. A competing balloon must be in charge of a member possessing the Club Aeronaut's Certificate, or a member who has made at least twelve ascents.

10. Entry must be made by the competitor by letter or telegram addressed to the Secretary before starting; such entry must state name and capacity of balloon, place of ascent, and approximate time of departure. One person only can compete in the same balloon at the same time. The entrance fee for each ascent is 5*s*.

11. A proper anchor and trail rope must be taken, and may not be dispensed with at any time.

12. Competitors are required on landing to properly fill in a landing certificate which must be obtained from the Secretary beforehand, and this certificate should contain such full particulars as will enable the Committee to easily locate on an Ordnance map of half-an-inch to a mile the exact point at which the descent was made. The landing certificate must be signed as correct by the competitor and others (if any) accompanying him, and two responsible persons present at the place of descent, and must be sent in to the Secretary within seven days.

13. Temporary descents will not be permitted.

14. Competing aerostats may not be dragged, except at the final descent for convenience in packing; in the latter case the distance for the purpose of the competition will be measured only up to the point at which such dragging commenced.

15. Competitors, by entering, agree to be bound by these rules, and a competitor who does not strictly comply with the rules will be liable to disqualification.

16. The decision of the Committee of the Royal Aero Club of the United Kingdom in all matters of dispute, or as to the interpretation of the rules, will be final.

Library.

Mr. R. W. A. Brewer has presented to the library a copy of his book, "The Art of Aviation."

Aviation Lantern Slides.

The Royal Aero Club have now acquired a large collection of lantern slides dealing with aviation, and members can hire these at a fee of £1 1*s*. for a period not exceeding three days. They include all the latest machines and pictures taken at aviation meetings in England and abroad. Application for hire should be made to the secretary.

HAROLD E. PERRIN,
Secretary.

166, Piccadilly.

Claude Grahame-White Testimonial Fund.

Donations received up to Tuesday, May 17th, 1910.

	£	s	d
Amount previously acknowledged ...	1,705	4	1
Harold Parsons	10	10	0
M. Atkinson Adam	1	1	0
Gen. Cummins, C.B., D.S.O.	1	1	0
Lieut. P. W. L. Broke-Smith, R.E. ...	0	10	0
E. C. and H. L. C.	0	10	0
Bessie Cook	0	5	0
Edith, Phyllis, Nora and Olive... ...	0	4	0
Carried forward	1,719	5	1

	£	s	d
Brought forward... ...	1,719	5	1
Four Bunkers at Hoylake	0	4	0
A few of the employees of Messrs. Tress & Co., Ltd.	0	4	0
Alexander Wyllie	0	3	0
S. Bushell	0	2	6
Vera Grounds	0	2	0
M. A. C.	0	1	0
Carried forward	1,720	1	7

	£	s	d
Brought forward... ...	1,720	1	7
G. A. Goodman	0	1	0
Two Schoolboys	0	1	0
R. H. White	0	1	0
French Admirer	0	0	10
	£1,720	5	5

PROGRESS OF FLIGHT ABOUT THE COUNTRY.

(NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary. We would ask Club Secretaries in future to see that the notes regarding their Clubs reach the Editor of FLIGHT, 44, St. Martin's Lane, London, W.C., by first post Tuesday at latest.)

Hampshire Aero Club (48, PALMERSTON ROAD, SOUTHSEA).

A SERIES of four model flying competitions have been arranged to take place at Fort Grange, Gosport, on Saturday, June 25th, at 2.30 p.m., for prizes given by Col. Massy, C.B. The conditions are as follows :—

1. There shall be four competitions, as follows :—A. Open to the world ; B. Open to members only ; C. Open to juveniles under 16 years ; D. Consolation prize open to non-prize winners. (Juveniles only.)

2. The models may be of any height, width, length or area, but must not be more than 10 lbs. in weight.

3. The competitors must start their models from within a given circle of 6 ft. diameter in any direction they may choose.

4. The prizes shall be awarded in accordance with length of flight only as measured in a straight line from the centre of the circle to the landing place.

5. In all cases a flight of 50 yards must be made in order to qualify for a prize.

6. Models must be started by hand only.

7. Competitors will be permitted to make not more than six essays with each model.

8. There shall be three prizes for each competition :—A, 1st, £1 ; 2nd, 15*s.* ; 3rd, 10*s.* B, 1st, gold medal (value £2) ; 2nd, gold medal (value £1 5*s.*) ; 3rd, silver medal, gold centre (value 15*s.*). C, 1st, £1 10*s.* ; 2nd, £1 ; 3rd, 10*s.* D, 1st, 7*s.* 6*d.* ; 2nd, 5*s.* ; 3rd, 2*s.* 6*d.*

9. There must be 9 starters in each competition for 3 prizes, 6 starters for 2 prizes, 3 starters for 1 prize.

10. There shall be no entrance fee.

11. Members who shall have joined the club on or before May 31st shall be eligible for B competition.

12. Competitors must send in their names and the number of models they intend to fly on or before May 31st to Capt. Marriott, 48, Palmerston Road, Southsea.

Kite and Model Aeroplane Assoc. (27, VICTORY RD., WIMBLEDON)

THE competitions for models postponed on May 7th on account of King Edward's death, will be held on Saturday, June 4th, on Wimbledon Common, at 2 o'clock. The Council have decided to re-open the entry list, but all entries must be received before Saturday, 28th inst., and a full list of entries will be printed in this paper on the day of the competition.

Special note is called to rule 5, viz., each competitor is entitled to three trials ; these will only be allowed if time permits, as already a good entry has been received, and perhaps time will not permit of so many trials.

Manchester Aero Club (9, ALBERT SQUARE, MANCHESTER).

OWING to the death of King Edward VII, the dinner arranged for members of the Manchester Aero Club at the Midland Hotel on Wednesday of last week was cancelled.

There will be a meeting of the members at the Victoria Hotel, Manchester, on Wednesday, 25th May, when the prizes at the recent model competition will be distributed. It is hoped that this will form a convenient gathering together of all the members, when they will be able to discuss a summer programme, &c.

Through the kindness of one of the members, the secretaries are able to announce that a workshop is now available for members of the club. The workshop is large enough for the construction and assembling of full-size machines, and being situated in the centre of the city is very convenient.

A special field is to be provided for the use of model owners, and it is hoped to be able to provide suitable accommodation for the members of the club who own full-size aeroplanes.

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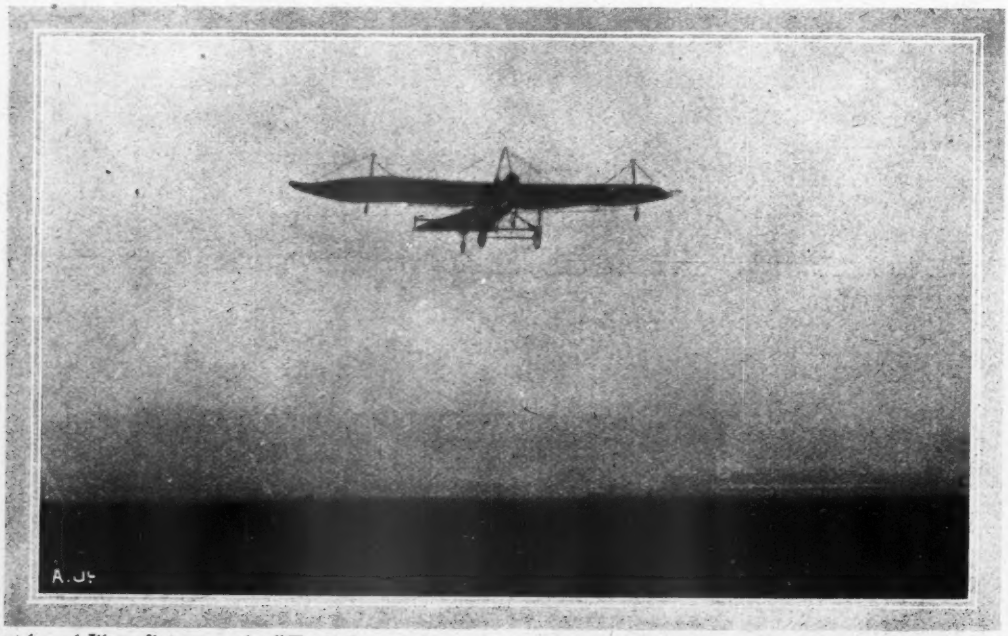
Etrich Carries Two Passengers and Breaks Records.

ON Thursday of last week Herr Etrich, the Austrian aviator, whose machine was illustrated in these pages last week, made a flight of 5 mins., during which he carried two passengers. We give this week a photograph of the machine in flight with the two on board.

On Saturday he beat the Austrian altitude and duration records, reaching a height of 300 metres during a trial which was continued for 1 hr. 11 mins. The Etrich monoplane is of 14 metres span, has a lifting surface of 32 sq. metres, with a tail surface of 10 square metres. It is fitted with a 50-h.p. 4-cylinder Clerget motor, which drives the 2·2 metre Chauviere propeller at 1,500 revs. per min.



Etrich and Illner flying on the "Taube" monoplane over the Steinfeld, near Wiener-Neustadt. On this machine Illner flew from Wiener-Neustadt, starting at 6.20 a.m. on Tuesday, to Vienna, a distance of 31 miles, arriving at the Semmeringer Heide at 7.30. After a short stop, he flew back to his starting point.

BRITISH NOTES OF THE WEEK.

Patrick Alexander Prize for Aero Engines.

SIX entries have been received for the Patrick Alexander £1,000 Prize, the entrants being:—Messrs. Green's Motor Patents Syndicate, Ltd., 55, Berners Street, Oxford Street, W.; Messrs. Humber, Ltd., Coventry; Messrs. Philearian, Ltd., St. Ann's Sunningfield Road, Hendon, N.W.; Messrs. Ripley Strong, Farnborough, Hants; Messrs. Warwick Wright, Ltd., 110, High Street, Manchester Square, London, W.; Messrs. Wolseley Tool and Motor Company, Adderley Park, Birmingham.

Designing and Building Club for London Air-Men.

LAST week we drew attention to a proposal for the formation of a new club in London for the purpose of providing and equipping the necessary workshops, and for building flying machines that would become the property of the club, and be entered by them in competitions. In this connection we are now reminded by the Hon. Assist. Sec. of the South-Western Aeronautical Society that that body already "has exactly what Messrs. North and Myers want. For some time past the members have been building, at their works in Hammersmith, a short-spanned monoplane, which is now approaching completion, and for which the members are also designing and building the engine. The works are open every evening from 6 p.m. till 11 p.m.; and the subscription is only 10s. per annum—as we are desirous that the question of expense should not deter those who are interested in flight from joining."

Roe Triplane at Manchester Exhibition.

MR. A. V. ROE has kindly lent his original 9-h.p. aeroplane to the Manchester Industrial Exhibition, and it is attracting a good deal of interest and attention. As Mr. Roe is a Manchester man, the city is naturally very proud of the honour.

Midlands Aviation Syndicate, Ltd.

IN another column will be found particulars of the Syndicate which has been formed to run the aero meeting under the auspices of the Midland Aero Club on the Dunstall Park racecourse from June 27th to July 2nd. It would appear to be run on distinctly good lines, as no shares or debentures will be issued except for cash; there is no sum payable for goodwill, no commissions nor promoter's money, and it is estimated that the preliminary expenses will not exceed £200.

Mr. MacArdle at Beaulieu.

DURING last week, large crowds were attracted to the Beaulieu Heath, near Hatchett Pond, to watch Mr. MacArdle and Mr. Drexel flying on their Blériot monoplanes.

A Biplane at Liverpool.

IN a biplane of his own construction, which somewhat resembles the Curtiss machine, Mr. C. Compton Paterson, of Liverpool, succeeded in making a flight of half-a-mile along the Freshfield shore, near Liverpool, on Saturday morning. The machine, the result of lengthy study of the subject in France, weighs about 500 lbs., and is fitted with a 30-h.p. engine.

Cross-Channel Flying.

TWO competitors have now entered for the Ruinart prize, to fly across the Channel and back, the newcomer being Max Anthoine who has also entered a Blériot. As under the rules only one competitor is allowed to attempt the feat at one time, M. Jacques de Lesseps is to make his attempt either to-day (Saturday) or to-morrow, while Anthoine, should the first attempt be unsuccessful, will try next week-end. De Lesseps intends to start from La Baraques, the same place as M. Blériot selected.

Flying Missionaries.

AT the annual meeting of the British and Foreign Bible Society, held in Queen's Hall last week, the Marquis of Northampton, in an optimistic speech, referred to the possibilities of aerial navigation in connection with the Society's work. He thought the time was not far distant when they might perhaps see the *colporteurs* of the Society flying through the air and dropping Testaments in those parts of the world which had up to the present proved inaccessible to the missionaries.

Gliding and Learning to Fly.

IT will be remembered that Wilbur Wright, when asked how one should proceed to learn the art of flying, almost invariably replies, "Get used to being in the air." One of the best methods of doing this is on a glider. In this connection those who are thinking of taking up flying will find quite a lot of useful and interesting information relating to gliding in a pamphlet issued by Messrs. T. W. K. Clarke and Co. It gives particulars and photographs of gliders built by Messrs. Clarke, on which some of our best flyers have had their initial training.

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FOREIGN AVIATION AND AIRSHIP NEWS.

A New Passenger Record.

ON Sunday Nicholas Kinet succeeded in handsomely beating his brother's passenger-carrying record by flying with a friend for 2h. 51m. 10s. The flight was made at Mourmelon on a Henry Farman machine. The previous record was made by Daniel Kinet, 2 hrs. 20 mins., which replaced that of Van den Born, 1h. 48m. 50s., both of which were to the credit of Henry Farman biplanes. On Monday N. Kinet carried his brother for 30 kiloms. across country, and later flew for 20 mins. with M. Leonino da Zara as a passenger.

Gordon-Bennett Aviation Cup.

AT last the American Aero Club seems to have come to a decision to hold the competition on Long Island, and have selected the Belmont racecourse as their aerodrome. It is stated that the Wright Bros. have decided to enter, and are building two special racing machines.

Doings at Mourmelon.

The Farman School.—Keeping at a height of about 100 metres, Martinet on his new machine flew for 1 hr. 45 mins. on the 13th inst., while Lieut. Fequent was flying for three-quarters of an hour, and his confrère Cammerman attained a height of 200 metres. Nicholas Kinet also made a long test on his new machine, flying round the ground ten times, and on Saturday he executed the necessary flights for obtaining his pilot's certificate. Martinet flew with his wife for some time on Saturday. Mr. Henry Farman has been out nearly every day trying new machines.

After making a flight of over an hour on Sunday, Martinet went up again, and flew round the surrounding country for 29 mins., passing over Suippes, Chalons, and Buoy. Tetard flew with a passenger for 1 hr. 48 mins., while Lindpaintner made two trips of 45 and 28 mins. duration respectively. Farman also took up several passengers, including some ladies, and attained a considerable altitude. Lebedeff, a new Russian pupil, flew 25 kiloms. with a passenger, the total weight carried being 120 kilogs. On Monday Martinet again made a cross-country trip, while Tetard made several trials of half an hour each. Van den Born, while landing from a flight on M. Kinet's machine, was caught by a sudden gust of wind and driven to earth rather sharply, but no great damage was done.

The Voisin School.—On the 10th inst., E. Paul on his Voisin flew for 45 mins., while on the 12th, having obtained his new machine which is fitted with ailerons, he was aloft for 20 mins. The next day he flew for 1 hr. 50 mins., during which he landed twice, and on Saturday for 30 mins. On Saturday Ruchonnet and Leonino da Zara also ascended for 16 mins.

The Antoinette School.—Starting off with the idea of making a long flight and possibly trying for the duration record, Wachter, on the 10th inst., had to come down after an hour and a half, owing to a heavy storm. On the 13th, Labouchère completed three circuits of the ground, carrying a passenger. He flew at a height of about 50 metres, passing over some trees.

On Sunday Wachter flew for 2 hrs. 2 mins., mounting to a height of 150 metres, while Labouchère, at his fourth trial, kept going for 21 mins., rising to an altitude of 100 metres.

Practice at Issy.

M. BLÉRIOT has once more commenced flying at Issy, and was out as well as Leblanc on Saturday last, trying some new machines. On the 12th inst. Lieut. Bier made some satisfactory trials with the new Montgolfier monoplane.

Trials at Juvisy.

LADOUGNE seems to be getting good results with the Goupy biplane lately, and on Saturday, at Juvisy, flew for three-quarters of an hour. Dufour, at the same time, carried a passenger on his Voisin for some distance. Several trials were also made by the former on Monday, and during one he carried his wife as a passenger.

A Biplane at Chartres.

MOUNTED on a biplane belonging to M. Robert Savary, Picard, on Saturday, flew for 4 kiloms. at a height of 5 metres. In

the morning M. Savary himself was up for some time over the country at a height of 100 metres.

An Aerial Circuit Prize.

M. HENRI LANIEL, Député of Calvados, has offered a prize of 5,000 frs. to the Ligue Nationale for the first aviator who, between sunrise and sunset, covers the following circuit, not making more than one landing. Starting from Lisieux, the aviator must pass between the clock towers at Orbec, Vimoutiers, Livarot, St. Pierre-sur-Dives, Mezidon and Lisieux, and another mark not more than two kiloms. away which will be selected later. The distance is about 88 kiloms., and the single landing allowed must be made on the Livarot racecourse.

A New French Association.

IN view of the rapid development of the sport and industry of flying, the Aero Club of France has decided to organise a new society, under the name of the Association Generale Aeronautique, with the object of banding together all French people who are interested in the subject. With this end in view the annual subscription has been fixed at 5 francs. The headquarters of the new body will be at the home of the Aero Club of France, 35, Rue François Ier, Paris.

Chinese Mission at Issy.

ON Monday, the Chinese Government Mission which is touring the world, visited Issy, where they inspected the Blériot and Astra works, and two military officers, Generals Ha Hang Chang and Li Anghi, went for a balloon trip. M. Leblanc made a flight of about 15 mins. on a Blériot machine, in which the Oriental visitors were specially interested.

Rougier to Give Up Flying.

ACCORDING to a despatch from Marseilles, Rougier after he has fulfilled his engagements at Budapest, will give up flying and devote all his attention to his motor car business in Paris.

Three on a Monoplane.

ON the 11th inst., at Rheims, Wagner, on a Hanriot monoplane, carried several passengers during short flights, and ended by carrying two, Marcel Hanriot and Georges Emile.

Efimoff Flying a Sommer Biplane.

EFIMOFF, the young Russian, who performed so extraordinarily on a Henry Farman biplane at Nice, is now turning his attention to the Sommer machine. He was at Mouzon on the 11th, and made two splendid flights, ending one of them by planing down from a height of 200 metres.

Doings at Pau.

AT his fourth lesson on Saturday last, Krastel on his Blériot monoplane flew for 35 minutes, and later in the day made the necessary flight for his pilote-aviateur certificate. Kuller on the Antoinette, after a trip lasting fourteen minutes, made one circuit of the grounds, 4·7 kiloms., in 2 mins. 39 secs.

Aeroplane Factory at Turin.

TURIN has made itself famous as a city for manufacturing motor cars, and is now turning its attention to aeroplanes. A group of capitalists are arranging to start a factory for flying machines at Chivasso, in the vicinity of the town. The municipality have unanimously granted a large area of ground as a site for the factory.

Exhibition on a Warship.

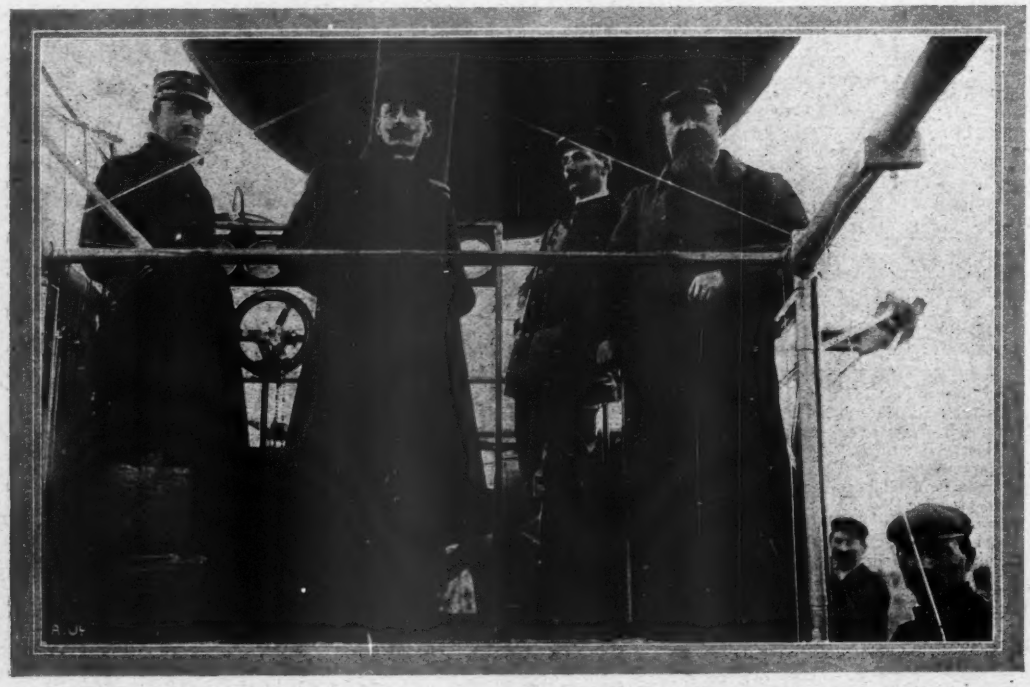
THE Danish Aeronautic Society have hit on a novel idea for an exhibition which they are arranging to hold from June 15th to July 15th. It is proposed to have on view models and accessories of all kinds appertaining to aeroplanes, dirigibles and balloons, and these exhibits will be arranged in the old frigate "Izland," which is at present moored at Langelinie. Enquiries should be addressed to 34, Amaliegade, Copenhagen, and entries will be received up to the 25th inst.

Flying over Sedan.

FLYING at an altitude varying between 400 and 500 feet, M. Sommer on Sunday last made a splendid cross-country trip, passing over Sedan, Torcy and Charleville, whence he turned home again, reaching his shed after dark. During this excursion a distance of about fifty miles was traversed, and the time occupied 1 hr. 10 mins. On Monday, Sommer flew for 35 minutes, while De Petrowski, one of the pupils, was flying for 10 minutes.

Wright Brothers to Fly Across Country.

ACCORDING to a telegram from Dayton, Ohio, the Wright Brothers feel a little jealous that Paulhan won the *Daily Mail* London to Manchester prize so easily. They are therefore arranging a little trip from their native city, Dayton, to Chicago, a distance of 250 miles. The date has not yet been fixed, but it is to be announced shortly.



M. Clement on the "bridge" of his "Clement-Bayard No. 2," which it is hoped will shortly sail for London.

Flying Progress in India.

FROM a Madras correspondent we learn that though there are several aeroplanes in India no one has yet made a mechanical flight. Mr. De Brunner, of Calcutta, succeeded in making a petrol engine driven model to fly several hundred feet, and he is now awaiting an engine for a full-size machine. Others have also made gliding experiments with some sort of machine, off a railway truck, down an incline; this resulted in a smash.

Signor Manzato, who now has a full-size monoplane waiting for its engine, says that he has glided down an incline by means of planes mounted on a cycle, the whole being propelled by a pedal-driven tractor screw.

Our correspondent adds: "If my petrol motor arrives at an early date I stand a very good chance of being the first to make a really mechanical flight in India, and you can understand that I am very keen on realising this"

"Clement-Bayard" Out Again.

ON Wednesday of last week the new "Clement-Bayard" airship was taken out for another trial spin. For three-quarters of an hour M. Clement manœuvred his great cruiser over Lamotte-Breuil, the vessel apparently answering every movement of the helm quite readily. Unfortunately, a too sudden landing was made, with the result that the framework of the car was smashed rather seriously, which meant that the airship would have to remain in dock for some days.

"Ville de Pau" Returns to Paris.

As Pau is now practically deserted, the Astra dirigible "Ville de Pau" has been packed up and returned to Paris, where it will be kept until next spring.

Six Hours Cruise in the Clouth Airship.

ON the 14th inst. Col. Kleist piloted the Clouth airship during a lengthy cruise. Starting from its shed at Bickerdorf the vessel was directed to Gladbach, and there manœuvred for some hours. A thick fog compelled the airship to land at Rheydt at the end of five hours, but shortly after the fog cleared, and the vessel reached her shed safely after an absence of six hours.

CORRESPONDENCE.

**** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

Correspondents asking questions relating to articles which they have read in FLIGHT, would much facilitate our work of reference by giving the number of the letter.

NOTE.—*Owing to the great mass of valuable and interesting correspondence which we receive, immediate publication is impossible, but each letter will appear practically in sequence and at the earliest possible moment.*

THE DIHEDRAL ANGLE.

[515] Many thanks to Mr. Clarke for his reply to my letter. The question of longitudinal stability is a good deal clearer to me, but it must present many complications to a designer; for instance, the effect of an *attitude* disturbance creating an *undulation* by its altering the direction of the axis of the propeller-shaft. In connection with this, I should like to know whether the "attitude" of a machine strictly means the inclination to the horizontal or to the actual direction of flight.

However, what I wish to write about now is the dihedral angle, for I am so convinced of the truth of my theory that I think I may be excused for putting it forward.

Fig. 1.

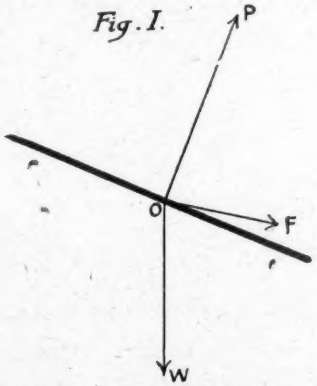


Fig. 2.

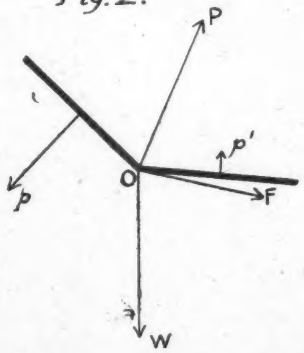
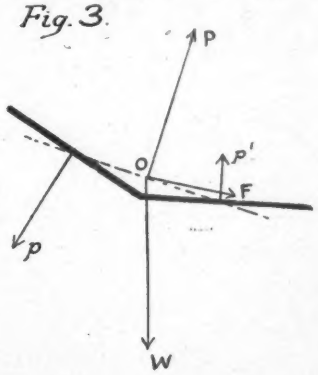


Fig. 3.



Considering *any* aeroplane in flight, the only forces acting in a plane perpendicular to the line of flight are the weight, W, and the resultant air pressure, P (*see* figures), which must be equal, since they normally balance one another. In a straight plane P acts always at right angles to it through its middle point (Fig. 1), but with a dihedral angle it must act along the bisector of the angle (Fig. 2) by reason of symmetry. When either aeroplane tilts over, P and W, being inclined, must produce a resultant, F, bisecting the angle between them. This force produces a lateral motion, tending slightly downwards. One needs no knowledge of mechanics to see the production of this motion, as the aeroplane moves sideways, exactly as a glider moves forward. If the centre of gravity is below that of pressure (in either kind of aeroplane) F will, with the lateral resistance, form a righting couple; but this is not caused by the dihedral angle, for if the centre of gravity, O, is on a level with that of lateral pressure (Fig. 3) the direct lateral resistance will act through O, and therefore cannot with F form a righting couple.

But (in Figs. 2 or 3) the wings are differently inclined to F, *i.e.*, to the line of motion (in the case depicted one is at a positive and the other a negative angle), so that the *aerodynamic* forces, p and p^1, will produce a righting couple, in the same way as the forces produced by the difference in the inclination of the fore and aft surfaces of a glider change its attitude. It is like simple vertical steering with a tail.

As far as I can remember, the above agrees with none of your correspondents except Mr. Maurice Olley in his letter in your issue of October 30th of last year. If the canting occurs through turning, it seems a mistake to suppose that F would be overcome by centrifugal force, as this force is surely overcome by the rudder. However, the turning might sometimes be too sudden for the righting effect to come into play fully in time.

Whether turning or not, there will, of course, be a series of oscillations damped at last by lateral resistance, as Mr. Rider (434) remarks; but I do not follow his other statements. In his figure, how can F be perpendicular to O C, one of its components? And if perpendicular, why should the machine describe a circle with centre, C? It certainly *will* describe a sort of circle, and the centre *may* be C, but he does not explain it.

With regard to theories based on the fall of the aeroplane from its cant, this fall is produced by a very small component of F, which is itself a very small force, and so these righting effects are negligible compared to the one given above. In the same way all the theories which disregard F leave out the principal factor, and are therefore of no practical value.

Dihedral planes are slightly inefficient because they spread the air out from beneath them; but who would not spare a little horse-power for increased stability?

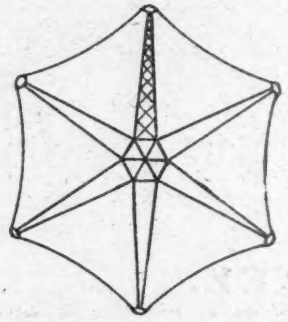
Wimbledon. B. BRUCE-WALKER.

VACUUM DIRIGIBLES.

[516] Here is a little problem which I think will interest your readers, particularly those with mathematical tendencies. Suppose

an airship could be constructed with incollapsible walls and air pumped out, when a sufficient weight of air was removed the airship would rise. The difficulty is to secure a construction which, while being extremely light, will withstand the enormous pressure.

The sectional sketch shows my idea of a method by which this difficulty might be overcome. It is simply a skeleton framework to



withstand the compression strains, covered with thin sheet steel of very high tensile strength. Perhaps some of your readers will make the necessary calculations to see whether such a construction comes within the possibility of success.

Bradford. HAROLD SMITH.

[The advantage of employing a vacuum as compared with hydrogen would only amount to ·0056 lb. extra lift per cubic foot capacity ("Flight Manual," Table 86). It is an extremely difficult matter to maintain a high vacuum even by the aid of constantly acting pumps, but it would, of course, be impossible to hold a vacuum at all for any length of time in a fabric envelope. Osmosis ("Flight Manual," Table 142), which is the cause of the loss of hydrogen in ordinary dirigibles, would similarly result in a loss of vacuum, even supposing that all the joints were absolutely air-tight. These drawbacks are quite apart from the main consideration of the crushing pressure of the atmosphere, which our correspondent seeks to overcome by his star frame.—ED.]

THE SKIDS AND OTHER FEATURES OF THE "MAYFLY."

[517] I am interested to see that Short Bros. are placing their motors in the centre of the planes, because a long time ago I suggested that the balance would be much better if the weight was placed between the planes, and not all on the lower plane, and rather above than below the centre. I had found this out on my model biplane, and so far the Curtiss machine was the only one to have the motor in that position.

I am experimenting with various skids. I find the wooden skids of the Wright type will stand the shock of landing, but something else generally breaks, so I am now trying steel and wood, of which I enclose a drawing. The "Mayfly" came down very hard on these last week, when the wind dropped, and she bounded like a tennis-ball, and nothing gave way, but the steel bent a little; they are, so far, the most satisfactory, but I am going to make another pair like No. 1 drawing with wheels, as I could then start her down the hill without men on the ropes; my difficulty is that I have to take the skids off each time to get her into the shed.

At present I am flying her with a Santos-Dumont type tail, but I am making another—a horizontal plane, pivoted so that I can alter the angle, with a single rudder above, and the rudder is connected with a wheel for steering on the ground. I am also putting a rudder in front, and the two will be connected. At present my two elevators work in the usual way, and also in opposite directions in connection with the balancing-planes, *i.e.*, for turning to the right, the right-hand balancer is depressed to right the falling tendency, and the left-hand elevator is depressed; the balancing-planes are hinged to outside rear stanchions, and are on the same principle as the Farman flaps, so that rocking the lever depresses one and the opposite elevator at the same time, and this has apparently a much quicker tendency to right the machine than using a balancer by itself. I find my method of waterproofing is excellent, even in a driving rain and wind no rain gets through.

LILIAN E. BLAND.

ENGINE CATALOGUES WANTED.

[518] Through the medium of your excellent paper might I ask for a few catalogues and prices of flight engines, rotary type preferred.

Prynnsberg, Clocolan, O.R.C., South Africa. A. H. DYE.

TESTING PROPELLER.

[519] Will you kindly enlighten me on how I am to ascertain the thrust of a propeller. I am testing a 5 ft. and a 6 ft. propeller with the blades set at various angles. Can you let me know through the medium of your excellent paper how this is done. Wishing your paper success in South Africa and sister Colonies.

Clocolan, South Africa. ALFRED H. DYE.

[Accurate tests of the thrusts of a propeller involve somewhat complicated apparatus, for it is of but little use to test a propeller intended for a flying machine in a stationary position. It must either be made to advance through the air at the speed of flight or it must be tested in a current of air of such a velocity as to produce the equivalent conditions. It is fairly common practice for pilots to anchor their aeroplanes to a spring balance in order to test the stationary thrust of their propellers, but this is only a very rough and ready means of obtaining an indication of the condition of the engine, and really throws little or no light upon the behaviour of the screw.

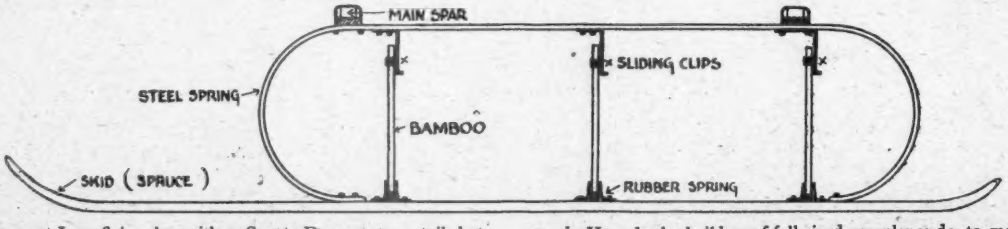
The best known method of testing propellers in motion is the whirling table. In this device the propeller is mounted upon the end of a long arm, that is capable of rotating about a central standard. A full-sized whirling table has been erected by Messrs. Vickers, Sons and Maxim to test propellers, and another has just been completed at the National Physical Laboratory to test models of full-sized propellers. Even this latter apparatus requires a very large room for its accommodation. Tests have been made in Germany, in which propellers were mounted on a trolley capable of running over a track, but we are not aware that any full-sized propellers have yet been tested in an artificial draught. Indeed, the whole subject of testing aerial propellers is only just beginning to develop signs of having aroused serious interest.—ED.]

STARTING OF MONOPLANES AND PROPELLER TORQUE.

[520] Could you answer me the following two questions through your interesting paper?

1st. I read in some journals reports of that sort: "The aeroplane (referring to a Blériot type) ran for about 10 metres, then the tail left the ground, and after running 10 metres more the main-planes did the same."

Would you tell me whether I am right in supposing that this takes place because the main-planes (the aeroplane running on the ground) have a greater angle of incidence than the normal angle of flight, and then, of course, the centre of pressure being situated beneath the centre of gravity, a righting pair tries to bring the planes to their normal position, and the elevator would then be lifted?



2nd. How do the builders of full-sized aeroplanes do to maintain lateral stability against the torque of the propeller? (Supposing the aeroplane is not provided with "ailerons" or warping of planes.)

You will have seen it is rather discouraging to be an aviator in my country. Le Blon dies at St. Sebastian. Gaudart, in his statement to the civil authorities of Madrid, said he could not be fined for not having flown at the aviation meeting, because, "Madrid being F. 30 metres over sea's niveau (level), and having a temperature of 30°, the air is too rarefied, and as soon as the aeroplane leaves the ground it does not find sufficient support, and falls ! ! !" (? ? ?)

We must thank Mr. Gaudart for this important discovery, then in the near future we shall not have to fear the dangers of a war by aeroplanes!

One week later the same Gaudart runs into a motor car at Zaragoza, and smashes his Voisin.

At Durango, two aviators, an Englishman and a Frenchman, have to leave the town with only the ashes of the two (by the spectators) burned aeroplanes.

Oh! Spain, martyrland of aviators!

Apologising for taking up so much valuable space, and wishing your paper every success.

Madrid. MIGUEL VILLANUEVA.

[In order to obtain more readily a high velocity over the ground when starting, the pilots of monoplanes of the Blériot type may decide to use the elevator, so as to raise the tail in order to reduce the angle of incidence of the main planes, and thereby acquire a high speed without much lifting effort.

The torque of a single propeller, which has always been supposed, on theoretical grounds, to be a source of probable inconvenience to the pilot, does not appear in practice to have had the disturbing influence that was expected, and there are some makers who consider that it is not worth while on this score using two propellers, or, even when two propellers are used, making them revolve in opposite directions.—ED.]

FLAPPING-WING MACHINES.

[521] Referring to your correspondent's letter *re* wing propulsion, I have worked for some time on an idea of my own in this direction, but although I started very much in favour of some method of wing propulsion, I am now convinced, after considerable experimenting, that wings are not a mechanical possibility. They do not lend themselves to the light construction which is necessary in a successful flying machine, and are not more efficient than a well-designed propeller as regards thrust, whilst they are of necessity considerably heavier.

I have, however, now completed a full-sized machine, in which I use wings for maintaining the correct balance of the machine, and it is in this direction, in my opinion, that wings will be found of most advantage, if suitably operated. Judging from previous results, I am expecting with my new machine to be able to hover in the air, whilst slowly descending in an almost vertical line, without fear of capsizing, as the balance is completely under control, and is rendered entirely independent of the speed of flight.

If your correspondent will communicate with me I shall be pleased to give him particulars of the results and conclusions I arrived at after about two years of experimental work with wings, used both as a method of propulsion, in conjunction with planes, and also on a direct lift machine, or ornithopter.

I have no doubt he will then be convinced that experimental work on these lines will not be productive of anything very satisfactory.

Flapping wings and other reciprocating mechanism is perfect in nature, but in practical mechanics must give way to the simplicity and adaptability of rotary motions for transmitting power, and especially is this so from a manufacturing point of view. Again, the wear and tear on quickly-moving reciprocating parts has to be taken into account, especially in the case of a flying machine, where freedom from vibration and absolute reliability is essential. Considering everything, very little development appears possible along these lines, although much good would be done if those who are building machines would work on more original lines, considering the early stage of the movement, instead of becoming mere copyists.

Coventry. WILLIAM A. WEAVER.

THE DAY MONOPLANE.

[522] The particulars published of Mr. F. Day's monoplane in your recent issue are most interesting, and the device for securing lateral stability by using the rear extremities of main planes as ailerons is very ingenious, and should give good results. But what I fail to understand is why Mr. Day should make his machine so short. Surely Mr. Day must realise that in this point bird construction is no guide. In birds, propelling and steering are performed through the same instrumentality, viz., the wings, which also serve as the supporting and "planing" mechanism, and it is possible for a bird to fly "tailless." To my mind, horizontal stability is of the utmost importance, and it is obvious that the leverage or control of rear planes in such a machine as described must be decreased by being placed so close to main planes; and in view of "sudden dives," which the short "base" would seem to invite, the apparently small size of rear controlling plane be inadequate to check quickly enough for really steady swift flight. There is a point that designers of aeroplanes sometimes seem to lose sight of, and that is the importance of eliminating every possible source of resistance to free passage through the air. Anyone who has travelled at 100 m.p.h., on a car or otherwise, will be able to realise the amount of power absorbed by even a fine steel wire under such conditions. The number of spars and struts, &c., in present designs of aeroplanes must, at speeds of 40 m.p.h. and over, cause a loss of 30 to 40 per cent. of power given by propeller. This loss increases very rapidly (with the cube of the speed) at high speeds. And second only to sound design for stability comes the need to reduce a lot of the out-structural fittings and supports so evident at present.

ANTHONY WESTLAKE.

STATASCOPES.

[523] I am much interested in your correspondent, L. Luzern Custer's proposed "statoscope," and undoubtedly such an accessory is absolutely essential to the equipment of the future "Air Traveller." The only weak point to my mind is the character of the oil or liquid employed in the capillary tube. An oil slightly viscous at ordinary temperatures would become sluggish in the cold experienced at high altitudes, whilst any spirit would probably evaporate more or less rapidly. In any case the variations of temperature would militate against the *rapidity* of the oil movement and re-formation being taken as a true indication of rapidity of ascent or descent.

Of course it must be possible to find a suitable fluid medium, and as I shall, perhaps, have such an instrument constructed for my own private interest, I would be glad of any suggestion made through the medium of your valuable and interesting paper.

ANTHONY WESTLAKE.

MR. GRAHAME-WHITE'S FLIGHT.

[524] I should be glad if you will allow me to correct a wrong impression that has got about in some quarters *re* the responsibility for the accident to Grahame-White's aeroplane at Lichfield on the first trip. At the time of the accident I was in Manchester, awaiting his arrival on the selected field, and before leaving Lichfield I had personally repaired certain small damage to the machine, and had handed over the machine to the personal care of Mr. Henry Farman, who expressed his satisfaction that I had done all necessary in the way of repairs. It will be seen that I was in no way responsible for what occurred more than twenty-four hours after I left the machine.

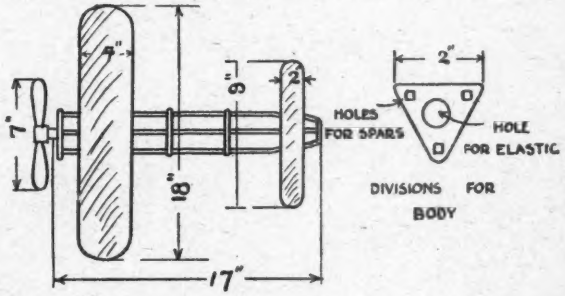
ROBERT W. A. BREWER.

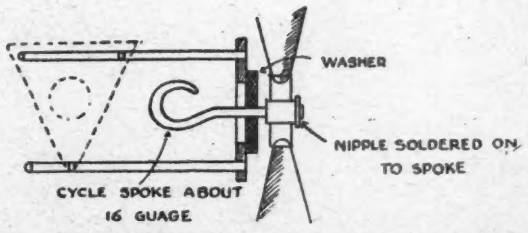
MODELS.

DESIGN FOR A MODEL.

[525] In reply to "Nulli Secundus" (424) for a sketch of small model, I think the following will be of some use to him.

The divisions of the body are easily cut out with a fret-saw, and





glass-papered up. The spars, &c., are made of cane split down to about $\frac{1}{16}$ in. or $\frac{3}{32}$ in. thick, and are glued in the divisions. The planes could be made of thin cardboard or cane, and covered with paper. If the model is flown with the small plane first, that plane

requires to be inclined slightly upwards. If the propeller is in front a small weight is required. I should advise a dihedral angle to keep the model on an even keel.

Could any reader oblige me with Nos. 45 and 46 of FLIGHT?

Coventry. L. G. RYLEY.

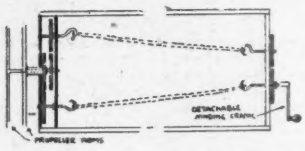
GEARED PROPELLERS.

[526] I am extremely obliged for your ready assistance, and gratified that my quotation from "Des Helices Aériennes" on the question of cambered blades should have brought forth a conclusive vindication of the principle.

A point I hope to see dealt with in your articles is the efficiency of a propeller working in the blast of another one, as in the Howard Wright machine, illustrated on page 52.

This arrangement of screws does not appear to find much favour with model makers, in spite of its compactness. It is illustrated in Mr. Aston's book, with differential drive, but I have met with no other allusion.

The differential gear, besides being difficult to make, is probably



unsatisfactory in very small sizes. Further, it provides for only one skein of elastic to drive both screws, unless additional gearing is introduced.

I beg to suggest the following arrangement, with apologies if it should be already familiar.

It appears to me that an arrangement more or less on above lines should be cheaper, lighter, and more efficient than the differential, for model sizes.

I wish to thank Mr. James F. Clunas for drawing and description of thrust measuring device, and Mr. Rankin Kennedy for the letter which follows in that issue.

N. Finchley. F. C. HARROP.

THE RIDLEY MODEL.

[527] I saw in your paper on February 26th (384), a scale-drawing of a model by C. Ridley. Would he kindly answer me the following questions if they are not too numerous:—

1. What is the dihedral angle?
2. What is the angle of attack?
3. Of what pitch and thrust is the propeller used?
4. What is the weight of finished machine?

Bristol. J. W. DEWAR.

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Paulhan's First-Aid Case.

ON the occasion of his historic flight from London to Manchester, Paulhan, we learn, carried with him a "Tabloid" first-aid aviator's case in aluminium. This little first-aid outfit contains a useful range of compressed requisites for emergency use in the compass of a small cigarette case. The aviator's foresight was justified, for he had occasion to use the case, which has now been added to Burroughs, Wellcome and Co.'s historical collection, and will be exhibited at the Japan-British Exhibition.

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NEW COMPANY REGISTERED.

Midlands Aviation Synd., Ltd., 34, Waterloo Street, Birmingham.—Capital £5,000, in 5,000 £1 shares. Directors: Sir Richard Paget, Bart., Henry Bell Thorp, Edward Cheshire, J.P., Fred Evans, H. Beresford Jones, Edward Lisle, Francis J. J. Gibbons.

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⊛ ⊛ ⊛ ⊛

PUBLICATIONS RECEIVED.

The Art of Aviation. By R. W. A. Brewer. London: Crosby, Lockwood and Son. Price 10*s.* 6*d.* net.

Pratt's Road Atlas of England and Wales. London: The Anglo-American Oil Co., Ltd., 22, Billiter Street, E.C. Price 2*s.* 6*d.*, post free.

Aeronautical Patents Published.

Published May 19th, 1910.

20,422. F. W. LANCHESTER. Flying machines.
25,402. J. MEANS. Aerial navigation.
25,415. O. HALBACH. Aeroplanes.
27,456. P. G. L. JEZZI. Framework of aerial machines.

DIARY OF FORTHCOMING EVENTS.

British Events.

1910.		1910.	
June 4	Kite and Glider Contests. Kite and Model Aeroplane Assoc.	July 16	Kite and Models Competition. Kite and Model Aeroplane Assoc.
June 25–July 2	Wolverhampton.	July 23	Balloon Race, Hurlingham.
July 2	Balloon Race, Hurlingham.	July 28–Aug. 3	Southport.
July 11–17	Bournemouth.*	Aug. 6–13	Lanark.*
		Aug. 15–20	Aintree.

Foreign Events.

1910.		1910.	
May 20–30	Verona.	Sept. 8–18	Bordeaux.
June 5–12	Vichy.	Sept. 24–Oct. 3	Milan.
June 5–15	Budapest.	Oct. 18–25	St. Louis. Gordon-Pennett Balloon Race.
June 26–July 10	Rheims.*	Oct. 25–Nov. 2	America. Gordon-Bennett Aeroplane Race.
July 24–Aug. 10	Belgium.		
Aug. 25–Sept. 4	Deauville.		

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8 ,,	20	,,	Flying Ground at Fambridge Illustrated Glossary.	1	0
10, Mar.	6	,,	Human Side of Flying ... Aero Club Ground at Shellbeach. Military Aeronautics.	1	0
12 ,,	20	,,	Souvenir Supplement ...	1	6
15, Apr.	10	,,	Engines at Olympia	1	0
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